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Water Resources Data for Michigan
Water Year 1980

(U.S.) Geological Survey
Lansing, MI

Prepared for

Office of Water Research and Technology
Washington, DC

Apr 81

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U.S. DEPARTMENT OF THE INTERIOR

DEPARTMENT OF NATURAL RESOURCES

Water Resources Data for Michigan

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-80-1

WATER YEAR 1980

Prepared in cooperation with the State of
Michigan and with other agencies

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INFORMATION SERVICE
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SPRINGFIELD, VA. 22161

CALENDAR FOR WATER YEAR 1980

1979

OCTOBER

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SEPTEMBER

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March 3, 1849

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

Water Resources Data for Michigan

U.S. GEOLOGICAL SURVEY WATER-DATA REPORT MI-80-1

WATER YEAR 1980

Prepared in cooperation with the State of
Michigan and with other agencies

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Doyle M. Frederick, Acting Director

For information on the water program in Michigan write to
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Lansing, Michigan 48910

1981

PREFACE

This report was prepared by personnel of the Michigan district of the Water Resources Division of the U.S. Geological Survey under the supervision of T. R. Cummings, District Chief, and J. E. Biesecker, Regional Hydrologist, Northeastern Region. It was done in cooperation with other agencies.

This report is one of a series issued by State. General direction for the series is by Philip Cohen, Chief Hydrologist, U.S. Geological Survey, and Robert J. Dingman, Assistant Chief Hydrologist for Scientific Publications and Data Management.

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Water resources data for the 1980 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels, water quality, and water temperature of ground-water wells. This report contains discharge records for 180 gaging stations; stage only records for 4 gaging stations; stage and contents for 5 lakes and reservoirs; water quality for 62 continuous-record stations; and water levels for 52 observation wells. Also included are 87 crest-stage partial-record stations and 62 low-flow partial-record stations. Additional water data were collected at various sites, not part of the systematic data-collection program, and are published as miscellaneous measurements. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State and Federal agencies in Michigan.

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GAGING STATIONS, IN DOWNSTREAM ORDER, FOR WHICH RECORDS ARE PUBLISHED

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WATER RESOURCES DATA FOR MICHIGAN, 1980

INTRODUCTION

Water resources data for the 1980 water year for Michigan consist of records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels and water temperature of ground-water wells. This volume contains records for water discharge at 180 gaging stations; stage only at 4 gaging stations; stage and contents at 5 lakes and reservoirs; water quality at 62 gaging stations; and water levels at 52 observations wells. Locations of these sites are shown on figures 4-9. Also included are data for 87 crest-stage partial-record stations and 62 low-flow partial-record stations. Additional water data were collected at various sites not involved in the systematic data-collection program and are published as miscellaneous measurements and analyses. These data represent that part of the National Water Data System operated by the U.S. Geological Survey and cooperating State, local, and Federal agencies in Michigan.

Records of discharge and stage of streams, and contents or stage of lakes and reservoirs were first published in a series of U.S. Geological Survey water-supply papers entitled, "Surface Water Supply of the United States." Through September 30, 1960, these water-supply papers were in an annual series and then in a 5-year series for 1961-65 and 1966-70. Records of chemical quality, water temperatures, and suspended sediment were published from 1941 to 1970 in an annual series of water-supply papers entitled, "Quality of Surface Waters of the United States." Records of ground-water levels were published from 1935 to 1974 in a series of water-supply papers entitled, "Ground Water Levels in the United States." Water-supply papers may be consulted in the libraries of the principal cities in the United States or may be purchased from Branch of Distribution, U.S. Geological Survey, 1200 South Eads Street, Arlington, VA 22202.

For water years 1961 through 1974, streamflow data were released by the Geological Survey in annual reports on a State-boundary basis. Water-quality records for water years 1964 through 1974 were similarly released either in separate reports or in conjunction with streamflow records. Ground-water records beginning with the 1956 calendar year and continuing through calendar year 1975 have been released by the Geological Survey in annual reports on a State-boundary basis.

Beginning with the 1975 water year, water data for streamflow, water quality, and ground water are published in official Survey reports on a State-boundary basis. These official Survey reports carry an identification number consisting of the two-letter State abbreviation, the last two digits of the water year, and the volume number. For example, this volume is identified as "U.S. Geological Survey Water-Data Report MI-80-1." For archiving and general distribution, the reports for water years 1971-74 are also identified as water-data reports. These water-data reports are for sale in paper copy or in microfiche by the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161.

Additional information, including current prices, for ordering specific reports may be obtained from the district chief at the address given on the back of the title page or by telephone 517-377-1608.

COOPERATION

The U.S. Geological Survey and organizations of the State of Michigan have had cooperative agreements for the systematic collection of streamflow records since 1930, for ground-water levels since 1932, and for water-quality records since 1951. Organizations that assisted in collecting data through cooperative agreement with the Survey are:

State Department of Natural Resources, H.A. Tanner, director, through Water Management Division, L.N. Witte, chief, and Geological Survey Division, A.E. Slaughter, chief.

State Department of State Highways, J.P. Woodford, director.

Assistance in the form of funds or services was given by the Corps of Engineers, U.S. Army, in collecting records for 33 gaging stations published in this report. Assistance was also furnished by the National Weather Service, National Oceanic Atmospheric Administration, U.S. Department of Commerce, Soil Conservation Service, U.S. Department of Agriculture, Environmental Protection Agency, and the National Park Service.

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Dickinson County Road Commission; Kalamazoo County Board of Supervisors; Macomb County Board of Supervisors; Oakland County Department of Public Works; Oakland County Drain Commission; Genesee County Drain Commission; Tri-County Planning Commission; Washtenaw County Drain Commission; Washtenaw County Planning Commission; Huron-Clinton Metropolitan Authority; Ypsilanti Community Utilities Authority; Cities of Ann Arbor, Battle Creek, Coldwater, Imlay City, Ironwood, Jackson, Kalamazoo, Lansing, Portage, and Ypsilanti; Village of Clarkston; Allied Paper Inc.; American Aggregate Corp.; Consumers Power Co.; Cleveland-Cliffs Iron Co.; Detroit Edison Co.; Fisher Body Division of General Motors Corp.; Hanna Mining Co.; Michigan Power Co.; Michigan Sugar Co.; Peter Eckrich and Sons, Inc.; Upper Peninsula Power Co.; and Wisconsin-Michigan Power Co.

Organizations that supplied data are acknowledged in station descriptions.

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HYDROLOGIC CONDITIONS

Streamflow during the 1980 water year was well above median in the Upper Peninsula and near median in the Lower Peninsula.

In the Upper Peninsula, October, November, and January runoff was excessive due to mild temperatures and heavy precipitation. The maximum daily flow in November was record high at the index station Sturgeon River near Sidnaw. An almost total absence of precipitation in May resulted in deficient runoff for that month, but summer runoff was above median although in the normal range. Precipitation during most of September increased runoff into the excessive range.

The northern part of the Lower Peninsula experienced normal runoff for 10 of the 12 months at the index station Muskegon River at Evart. January and September were excessive, paralleling conditions in the Upper Peninsula.

Runoff in the southern part of the Lower Peninsula was deficient in 1978 and 1979. It returned to normal in 1980, due largely to excessive runoff in August and September. The monthly mean discharges for both months were record high at the index station Red Cedar River at East Lansing.

In figure 1, the monthly and annual mean discharge is compared with the median discharge for the period 1941-70 at the three index stations.

Ground-water levels were below normal in the southcentral and southeastern part of the Lower Peninsula. Elsewhere levels were generally near to above normal.

In 1980, dissolved solids concentrations showed no significant changes for Michigan's NASQAN stations when compared with records for 1976-79. In the Upper Peninsula, samples from St. Marys River at Saulte Ste. Marie, Escanaba River at Cornell, and Ford River near Hyde, were found to contain increased concentrations of dissolved solids. In the Lower Peninsula, Clinton River at Mt. Clemens, and River Raisin near Monroe both were found to have slight decreases in concentrations when this water year was compared to the 1977-79 period. No residues of pesticides or PCB's were found nor were abnormally high concentrations of trace metals present. Occasional high values for iron and manganese were found but this is not unusual in Michigan.

DEFINITION OF TERMS

Terms related to streamflow, water-quality, and other hydrologic data, as used in this report, are defined below. See also the table for converting English units to International System of units (SI) on the inside of the back cover.

Acre-foot (AC-FT, acre-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or about 326,000 gallons or 1,233 cubic meters.

Adenosine triphosphate (ATP) is the primary energy donor in cellular life process. Its central role in living cells makes it an excellent indicator of the presence of living material in water. A measure of ATP therefore provides a sensitive and rapid estimate of biomass. ATP is reported in micrograms per liter of the original water sample.

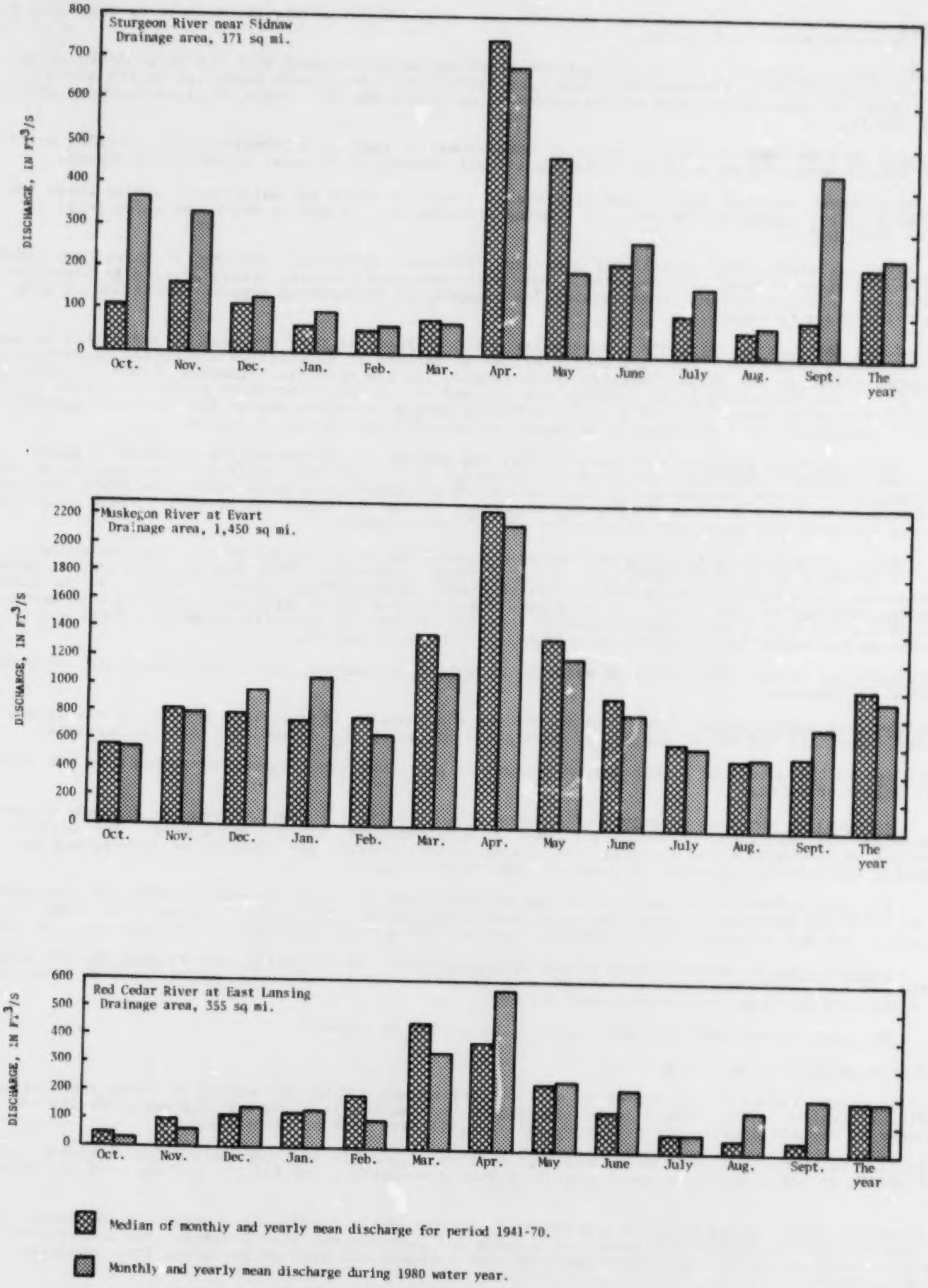


Figure 1. Discharge during 1980 water year compared with median discharge for period 1941-70 for three representative stations.

Algae are mostly aquatic single-celled, colonial, or multi-celled plants, containing chlorophyll and lacking roots, stems, and leaves.

Algal growth potential (AGP) is the maximum algal dry weight biomass that can be produced in a natural water sample under standardized laboratory conditions. The growth potential is the algal biomass present at stationary phase and is expressed as milligrams dry weight of algae produced per liter of sample.

Aquifer is a geologic formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

Artesian means confined and is used to describe a well in which the water level stands above the top of the aquifer, tapped by the well. A flowing artesian well is one in which the water level is above the land surface.

Bacteria are microscopic unicellular organisms, typically spherical, rodlike, or spiral and threadlike in shape, often clumped into colonies. Some bacteria cause disease, others perform an essential role in nature in the recycling of materials; for example, by decomposing organic matter into a form available for reuse by plants.

Total coliform bacteria are a particular group of bacteria that are used as indicators of possible sewage pollution. They are characterized as aerobic or facultative anaerobic, gram-negative nonspore-forming, rod-shaped bacteria which ferment lactose with gas formation within 48 hours at 35°C. In the laboratory these bacteria are defined as the organisms which produce colonies within 24 hours when incubated at 35°C ± 1.0°C on M-Endo medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal coliform bacteria are bacteria that are present in the intestines or feces of warm-blooded animals. They are often used as indicators of the sanitary quality of the water. In the laboratory they are defined as all organisms which produce blue colonies within 24 hours when incubated at 44.5°C ± 0.2°C on M-FC medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Fecal streptococcal bacteria are bacteria found also in intestines of warm-blooded animals. Their presence in water is considered to verify fecal pollution. They are characterized as gram-positive, cocci bacteria which are capable of growth in brain-heart infusion broth. In the laboratory they are defined as all the organisms which produce red or pink colonies within 48 hours at 35°C ± 1.0°C on M-enterrococcus medium (nutrient medium for bacterial growth). Their concentrations are expressed as number of colonies per 100 mL of sample.

Bed material is the unconsolidated material of which a streambed, lake, pond, reservoir, or estuary bottom is composed.

Biochemical oxygen demand (BOD) is a measure of the quantity of dissolved oxygen, in milligrams per liter, necessary for the decomposition of organic matter by microorganisms, such as bacteria.

Biomass is the amount of living matter present at any given time, expressed as the mass per unit area of volume of habitat.

Ash mass is the mass or amount of residue present after the residue from the dry mass determination has been ashed in a muffle furnace at a temperature of 500°C for 1 hour. The ash mass values of zooplankton and phytoplankton are expressed in grams per cubic meter (g/m^3), and periphyton and benthic organisms in grams per square meter (g/m^2).

Dry mass refers to the mass of residue present after drying in an oven at 60°C for zooplankton and 105°C for periphyton, until the mass remains unchanged. This mass represents the total organic matter, ash and sediment, in the sample. Dry mass values are expressed in the same units as ash mass.

Organic mass or volatile mass of the living substance is the difference between the dry mass and ash mass, and represents the actual mass of the living matter. The organic mass is expressed in the same units as for ash mass and dry mass.

Wet mass is the mass of living matter plus contained water.

Bottom material: See Bed material.

Cells/volume refers to the number of cells of any organism which is counted by using a microscope and grid or counting cell. Many planktonic organisms are multicelled and are counted according to the number of contained cells per sample, usually milliliters (mL) or liters (L).

Cfs-day is the volume of water represented by flow of 1 cubic foot per second for 24 hours. It is equivalent to 86,400 cubic feet, approximately 1.9835 acre-feet, about 646,000 gallons or 2,447 cubic meters.

Chemical oxygen demand (COD) is a measure of the chemically oxidizable material in the water, and furnishes an approximation of the amount of organic and reducing material present. The determined value may correlate with natural water color or with carbonaceous organic pollution from sewage or industrial wastes.

Chlorophyll refers to the green pigments of plants. Chlorophyll a and b are the two most common pigments in plants.

Color unit is produced by one milligram per liter of platinum in the form of the chloroplatinate ion. Color is expressed in units of the platinum-cobalt scale.

Contents is the volume of water in a reservoir or lake. Unless otherwise indicated, volume is computed on the basis of a level pool and does not include bank storage.

Control designates a feature downstream from the gage that determines the stage-discharge relation at the gage. This feature may be a natural constriction of the channel, an artificial structure, or a uniform cross section over a long reach of the channel.

Control structure as used in this report is a structure on a stream or canal that is used to regulate the flow or stage of the stream or to prevent the intrusion of salt water.

Cubic feet per second per square mile (CFSM) is the average number of cubic feet of water flowing per second from each square mile of area drained, assuming that the runoff is distributed uniformly in time and area.

Cubic foot per second (FT^3/s, ft^3/s) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute or 0.02832 cubic meters per second.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment), that passes a given point within a given period of time.

Mean discharge (MEAN) is the arithmetic mean of individual daily mean discharges during a specific period.

Instantaneous discharge is the discharge at a particular instant of time.

Dissolved refers to the amount of substance present in true chemical solution. In practice, however, the term includes all forms of substance that will pass through a 0.45-micrometer membrane filter, and thus may include some very small (coloidal) suspended particles. Analyses are performed on filtered samples.

Diversity index is a numerical expression of evenness of distribution of aquatic organisms. The formula for diversity index is:

$$\bar{d} = -\sum_{i=1}^{s} \frac{n_i}{n} \log_2 \frac{n_i}{n}$$

Where n_i is the number of individuals per taxon, n is the total number of individuals, and s is the total number of taxa in the sample of the community. Diversity index values range from zero, when all the organisms in the sample are the same, to some positive number, when some or all of the organisms in the sample are different.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontribution areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Gage height (G.H.) is the water-surface elevation referred to some arbitrary gage datum. Gage height is often used interchangeably with the more general term "stage", although gage height is more appropriate when used with a reading on a gage.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Hardness of water is a physical-chemical characteristic that is commonly recognized by the increased quantity of soap required to produce lather. It is attributable to the presence of alkalined earths (principally calcium and magnesium) and is expressed as equivalent calcium carbonate ($CaCO_3$).

Hydrologic unit is a geographic area representing part or all of a surface drainage basin or distinct hydrologic feature as delineated by the Office of Water Data Coordination on the State Hydrologic Unit Maps; each hydrologic unit is identified by an 8-digit number.

Metamorphic stage refers to the stage of development that an organism exhibits during its transformation from an immature form to an adult form. This developmental process exists for most insects, and the degree of difference from the immature stage to the adult form varies from relatively slight to pronounced, with many intermediates. Examples of metamorphic stages of insects are egg-larva-adult or egg-nymph-adult.

Methylene blue active substance (MBAS) is a measure of apparent detergents. This determination depends on the formation of a blue color when methylene blue dye reacts with synthetic detergent compounds.

Micrograms per gram (ug/g) is a unit expressing the concentration of a chemical element as the mass (micrograms) of the element sorbed per unit mass (gram) of sediment.

Micrograms per liter (UG/L, ug/L) is a unit expressing the concentration of chemical constituents in solution as mass (micrograms) of solute per unit volume (liter) of water. One thousand micrograms per liter is equivalent to one milligram per liter.

Milligrams per liter (MG/L, mg/L) is a unit for expressing the concentration of chemical constituents in solution. Milligrams per liter represent the mass of solute per unit volume (liter) of water. Concentration of suspended sediment also is expressed in mg/L, and is based on the mass of sediment per liter of water-sediment mixture.

National Geodetic Vertical Datum of 1929 (NGVD) is a geodetic datum derived from a general adjustment of the first order level nets of both the United States and Canada. It was formerly called "Sea Level Datum of 1929" or "mean sea level" in this series of reports. Although the datum was derived from the average sea level over a period of many years at 26 tide stations along the Atlantic, Gulf of Mexico, and Pacific Coasts, it does not necessarily represent local mean sea level at any particular place.

Organism is any living entity, such as an insect, phytoplankter, or zooplankter.

Organism count/area refers to the number of organisms collected and enumerated in a sample and adjusted to the number per area habitat, usually square meters (m^2), acres, or hectares. Periphyton benthic organisms, and macrophytes are expressed in these terms.

Organism count/volume refers to the number of organisms collected and enumerated in a sample and adjusted to the number per sample volume, usually milliters (mL) or liters (L). Numbers of planktonic organisms can be expressed in these terms.

Total organism count is the total number of organisms collected and enumerated in any particular sample.

Partial-record station is a particular site where limited streamflow and/or water-quality data are collected systematically over a period of years for use in hydrologic analyses.

Particle-size is the diameter, in millimeters (mm), of suspended sediment or bed material determined by either sieve or sedimentation methods. Sedimentation methods (pipet, bottom-withdrawal tube, visual-accumulation tube) determine fall diameter of particles in either distilled water (chemically dispersed) or in native water (the river water at the time and point of sampling).

Particle-size classification used in this report agrees with recommendations made by the American Geophysical Union Subcommittee on Sediment Terminology.

The classification is as follows:

Classification	Size (mm)	Method of analyses
Clay	0.00024 - 0.004	Sedimentation
Silt	.004 - .062	Sedimentation
Sand	.062 - 2.0	Sedimentation or sieve
Gravel	2.0 - 64.0	Sieve

The particle-size distributions given in this report are not necessarily representative of all particles in transport in the stream. Most of the organic material is removed and the sample is subjected to mechanical and chemical dispersion before analysis in distilled water. Chemical dispersion is not used for native water analysis.

Percent composition is a unit for expressing the ratio of a particular part of a sample or population to the total sample or population, in terms of types, numbers, mass or volume.

Periphyton is the assemblage of microorganisms attached to and growing upon solid surfaces. While primarily consisting of algae, they also include bacteria, fungi, protozoa, rotifers, and other small organisms. Periphyton is a useful indicator of water quality.

Pesticides are chemical compounds used to control undesirable plants and animals. Major categories of pesticides include insecticides, miticides, fungicides, herbicides, and rodenticides. Insecticides and herbicides, which control insects and plants respectively, are the two categories reported.

Picocurie (PC, pCi) is one trillionth (1×10^{12}) of the amount of radioactivity represented by a curie (Ci). A curie is the amount of radio activity that yields 3.7×10^{10} radio active disintegrations per second. A picocurie yields 2.22 dpm (disintegrations per minute).

Plankton is the community of suspended, floating, or weakly swimming organisms that live in the open water of lakes and rivers.

Phytoplankton is the plant part of the plankton. They are usually microscopic and their movement is subject to the water currents. Phytoplankton growth is dependent upon solar radiation and nutrient substances. Because they are able to incorporate as well as release materials to the surrounding water, the phytoplankton have a profound effect upon the quality of the water. They are the primary food producers in the aquatic environment, and are commonly known as algae.

Blue-green algae are a group of phytoplankton organisms having a blue pigment, in addition to the green pigment called chlorophyll. Blue-green algae often cause nuisance conditions in water.

Diatoms are the unicellular or colonial algae having a siliceous shell. Their concentrations are expressed as number of cells/mL of sample.

Green algae have chlorophyll pigments similar in color to those of higher green plants. Some forms produce algal mats or floating "moss" in lakes. Their concentrations are expressed as number of cells/mL of sample.

Zooplankton is the animal part of the plankton. Zooplankton are capable of extensive movements within the water column, and are often large enough to be seen with the unaided eye. Zooplankton are secondary consumers feeding upon bacteria, phytoplankton, and detritus. Because they are the grazers in the aquatic environment, the zooplankton are a vital part of the aquatic food web. The zooplankton community is dominated by small crustaceans and rotifers.

Polychlorinated biphenyls (PCBs) are industrial chemicals that are mixtures of chlorinated biphenyl compounds having various percentages of chlorine. They are similar in structure to organochlorine insecticides.

Primary productivity is a measure of the rate at which new organic matter is formed and accumulated through photosynthetic and chemosynthetic activity of producer organisms (chiefly green plants). The rate of primary production is estimated by measuring the amount of oxygen released (oxygen method) or the amount of carbon assimilated by the plants (carbon method).

Milligrams of carbon per area or volume per unit time [mg $C/(m^2 \cdot time)$] for periphyton and macrophytes and [mg $C/(m^3 \cdot time)$] for phytoplankton are units for expressing primary productivity. They define the amount of carbon dioxide consumed as measured by radioactive carbon (carbon 14). The carbon 14 method is of greater sensitivity than the oxygen light and dark bottle method, and is preferred for use in unenriched waters. Unit time may be either the hour or day, depending on the incubation period.

Milligrams of oxygen per area or volume per unit time [mg $O_2/(m^2 \cdot time)$] for periphyton and macrophytes and [mg $O_2/(m^3 \cdot time)$] for phytoplankton are the units for expressing primary productivity. They define production and respiration rates as estimated from changes in the measured dissolved oxygen concentration. The oxygen light and dark bottle method is preferred if the rate of primary production is sufficient for accurate measurements to be made within 24 hours. Unit time may be either the hour or day, depending on the incubation period.

Runoff in inches (IN, in) shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Sediment is solid material that originates mostly from disintegrated rocks and is transported by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material, such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

Suspended sediment is the sediment that at any given time is maintained in suspension by the upward components of turbulent currents or that exists in suspension as a colloid.

Suspended-sediment concentration is the velocity-weighted concentration of suspended sediment in the sampled zone (from the water surface to a point approximately 0.3 ft above the bed) expressed as milligrams of dry sediment per liter of water-sediment mixture (mg/L).

Suspended-sediment discharge (tons/day) is the sum of the suspended-sediment discharge and the bed-load discharge. It is the total quantity of sediment, as measured by dry weight or volume, that passes a section during a given time. It is computed by multiplying discharge times mg/L times 0.0027.

Mean concentration is the time-weighted concentration of suspended sediment passing a stream section during a 24-hour day.

Solute is any substance derived from the atmosphere, vegetation, soil, or rocks that is dissolved in water.

Specific conductance is a measure of the ability of a water to conduct an electrical current. It is expressed in micromhos per centimeter at 25°C. Specific conductance is related to the type and concentration of ions in solution and can be used for approximating the dissolved-solids content of the water. Commonly, the concentration of dissolved solids (in milligrams per liter) is about 65 percent of the specific conductance (in micromhos). This relation is not constant from stream to stream, and it may vary in the same source with changes in the composition of the water.

Stage-discharge relation is the relation between gage height (stage) and volume of water per unit of time, flowing in a channel.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

Substrate is the physical surface upon which an organism lived.

Natural substrates refers to any naturally occurring emersed or submersed solid surface, such as a rock or tree, upon which an organism lived.

Artificial substrate is a device which is purposely placed in a stream or lake for colonization of organisms. The artificial substrate simplifies the community structure by standardizing the substrate from which each sample is taken. Examples of artificial substrates are basket samplers (made of wire cages filled with clean streamside rocks) and multi-plate samplers (made of hardboard) for benthic organism collection, and plexiglass strips for periphyton collection.

Surface area of a lake is that area outlined on the latest U.S.G.S. topographic map as the boundary of the lake and measured by a planimeter in acres. In localities not covered by topographic maps, the areas are computed from the best maps available at the time planimetered. All areas shown are those for the stage when the planimetered map was made.

Surficial bed material is that part (0.1 to 0.2 ft) of the bed material that is sampled using U.S. Series Bed-Material Samplers.

Suspended (as used in tables of chemical analyses) refers to the amount (concentration) of the total concentration in a water-sediment mixture. The water-sediment mixture is associated with (or sorbed on) that material retained on a 0.45 micrometer filter.

Taxonomy is the division of biology concerned with the classification and naming of organisms. The classification of organisms is based upon a hierarchical scheme beginning with Kingdom and ending with Species at the base. The higher the classification level, the fewer features the organisms have in common. For example, the taxonomy of a particular mayfly, Hexagenia limbata is the following:

Kingdom	Animal
Phylum	Arthropoda
Class	Insecta
Order	Ephemeroptera
Family	Ephemeridae
Genus	Hexageria
Species	Hexagenia limbata

Time-weighted average is computed by multiplying the number of days in the sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the total number of days. A time-weighted average represents the composition of water that would be contained in a vessel or reservoir that had received equal quantities of water from the stream each day for the year.

Tons per acre-foot indicates the dry mass of dissolved solids in 1 acre-foot of water. It is computed by multiplying the concentration in milligrams per liter by 0.00136.

Tons per day is the quantity of substance in solution or suspension that passes a stream section during a 24-hour day.

Total load (tons) is the total quantity of any individual constituent, as measured by dry mass or volume, that is dissolved in a specific amount of water (discharge) during a given time. It is computed by multiplying the total discharge, times the mg/L of the constituent, times the factor 0.0027, times the number of days.

Weighted average is used in this report to indicate discharge-weighted average. It is computed by multiplying the discharge for a sampling period by the concentrations of individual constituents for the corresponding period and dividing the sum of the products by the sum of the discharges. A discharge-weighted average approximates the composition of water that would be found in a reservoir containing all the water passing a given location during the water year after thorough mixing in the reservoir.

WDR is used as an abbreviation for "Water-Data Report" in reference to published reports beginning in 1975.

WRD is used as an abbreviation for "Water-Resources Data" in the REVISED RECORDS paragraph to refer to State annual basic-data reports published before 1975.

WSP is used as an abbreviation for "Water-Supply Paper" in references to previously published reports.

DOWNSTREAM ORDER AND STATION NUMBER

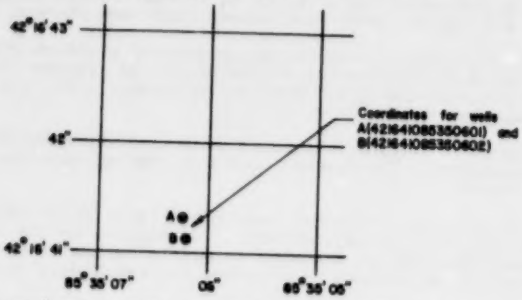
Since October 1, 1950, the order of listing hydrologic-station records in Survey reports is in a downstream direction along the main stream. All stations on a tributary entering upstream from a main-stream station are listed before that station. A station on a tributary that enters between two main-stream stations is listed between them. A similar order is followed in listing stations on first rank, second rank, and other ranks of tributaries. The rank of any tributary on which a station is situated with respect to the stream to which it is immediately tributary is indicated by an indention in a list of stations in the front of the report. Each indention represents one rank. This downstream order and system of indention show which stations are on tributaries between any two stations and the rank of the tributary on which each station is situated.

As an added means of identification, each hydrologic station, and partial-record station has been assigned a station number. These are in the same downstream order used in this report. In assigning station numbers, no distinction is made between partial-record and continuous-record stations; therefore, the station number for a partial-record station indicates downstream-order position in a list made up of both types of stations. Gaps are left in the series of numbers to allow for new stations that may be established; hence, the numbers are not consecutive. The complete 8-digit number for each station, such as 04058500, which appears just to the left of the station name, includes the 2-digit part number "04" plus the 6-digit downstream order number "058500".

NUMBERING SYSTEM FOR WELLS

Each well is identified by means of (1) a 15-digit number that is based on the grid system of latitude and longitude followed by (2) a local number that is provided for continuity with older reports and for other use as dictated by local needs.

Each well is located as a point on a map by a number based on the universal system of latitude and longitude. In this report, this is the first set of numbers shown for each well. For maximum utility, latitude and longitude numbers are determined to seconds. The first six digits denote degrees, minutes, and seconds of north latitude; the next seven digits denote degrees, minutes, and seconds of west longitude. The last two numbers are sequential numbers assigned in the order that the wells were recorded within a designated latitude-longitude grid.



42°16'43"
42"
42°16'41"
85°35'07"
06"
85°35'05"
A
B
Coordinates for wells A(421641085350601) and B(421641085350602)

Figure 2. System for numbering wells (latitude and longitude).

The local well number indicates the location of wells within the rectangular subdivision of land with reference to the Michigan meridian and base line. The first two segments of the well number designate township and range, the third segment of the number designates the section and the letters A through D designate successively smaller subdivisions of the section as shown in figure 3. Thus, a well designated as 32N 6E 16CCCB would be located to the nearest 2.5 acres (1 hectare) and would be within the shaded area in section 16. In the event that two or more wells are located in the same 2.5 acre (1 hectare) tract, a sequential number designation follows the letter deesignations--for example, 16CCCB1, 16CCCB2, 16CCCB3, etc.

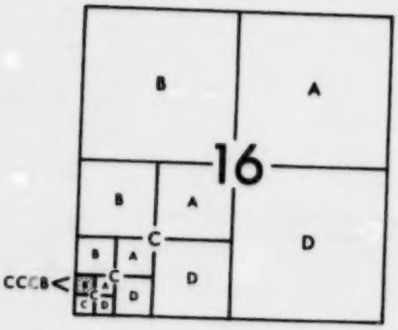


Figure 3. Well numbering system in Michigan.

SPECIAL NETWORKS AND PROGRAMS

Hydrologic bench-mark station is one that provides hydrologic data for a basin in which the hydrologic regimen will likely be governed solely by natural conditions. Data collected at a bench-mark station may be used to separate effects of natural from manmade changes in other basins which have been developed and in which the physiography, climate, and geology are similar to those in the undeveloped bench-mark basin.

National stream-quality accounting network (NASQAN) is a data collection network designed by the U.S. Geological Survey to meet many of the information demands of agencies or groups involved in national or regional water-quality planning and management. Both accounting and broad-scale monitoring objectives have been incorporated in the network design. Areal configuration of the network is based on river-basin accounting units (identified by 8-digit hydrologic-unit numbers) designated by the Office of Water Data Coordination in consultation with the Water Resources Council. Primary objectives of the network are (1) to depict areal variability of streamflow and water-quality conditions nationwide on a year-by-year basis and (2) to detect and assess long-term changes in stream quality.

Pesticide program is a network of regularly sampled water-quality stations where samples are collected to determine the concentration and distribution of pesticides in streams where potential contamination could result from the application of the commonly used insecticides and herbicides. Operation of the network is a Federal interagency activity.

Radiochemical program is a network of regularly sampled water-quality stations where samples are collected to be analyzed for radioisotopes. The streams that are sampled represent major drainage basins in the conterminous United States.

Tritium network is a network of stations which has been established to provide baseline information on the occurrence of tritium in the Nation's surface waters. In addition to the surface-water stations in the network, tritium data are also obtained at a number of precipitation stations. The purpose of the precipitation stations is to provide an estimate sufficient for hydrologic studies of the tritium input to the United States.

EXPLANATION OF STAGE AND WATER-DISCHARGE

Collection and computation of data

The base data collected at gaging stations consist of records of stage and measurements of discharge of streams or canals, and stage, surface area, and contents of lakes or reservoirs. In addition, observations of factors affecting the stage-discharge relation or the stage-capacity relation, weather records, and other information are used to supplement base data in determining the daily flow or volume of water in storage. Records of stage are obtained from either direct readings on a nonrecording gage or from a water-stage recorder that gives either a continuous graph of the fluctuations or a tape punched at selected time intervals. Measurements of discharge are made with a current meter, using the general methods adopted by the Geological Survey. These methods are described in standard textbooks, in Water-Supply Paper 888, and in U.S. Geological Survey Techniques of Water Resources Investigations, book 3, chapter A6.

For stream-gaging stations, rating tables giving the discharge for any stage are prepared from stage-discharge relation curves. If extensions to the rating curves are necessary to express discharge greater than measured, they are made on the basis of indirect measurements of peak discharge (such as slope-area or contracted-opening measurements, computation of flow over dams or weirs), step-backwater techniques, velocity-area studies, and logarithmic plotting. The daily mean discharge is computed from gage heights and rating tables, then the monthly and yearly mean discharge are computed from the daily figures. If the stage-discharge relation is subject to change because of frequent or continual change in the physical features that form the control, the daily mean discharge is computed by the shifting-control method, in which correction factors based on individual discharge measurements and notes by engineers and observers are used in applying the gage heights to the rating tables. If the stage-discharge relation for a station is temporarily changed by the presence of aquatic growth or debris on the control, the daily mean discharge is computed by what is basically the shifting-control method.

At some stream-gaging stations the stage-discharge relation is affected by backwater from reservoirs, tributary streams, or other sources. This necessitates the use of the slope method in which the slope or fall in a reach of the stream is a factor in computing discharge. The slope or fall is obtained by means of an auxiliary gage set at some distance from the base gage. At some stations the stage-discharge relation is affected by changing stage; at these stations the rate of change in stage is used as a factor in computing discharge.

At some northern stream-gaging stations the stage-discharge relation is affected by ice in the winter, and it becomes impossible to compute the discharge in the usual manner. Discharge for periods of ice effect is computed on the basis of the gage-height record and occasional winter discharge measurements. Consideration is given to the available information on temperature and precipitation, notes by gage observers and hydrologist, and comparable records of discharge for other stations in the same or nearby basins.

For a lake or reservoir station, capacity tables giving the contents for any stage are prepared from stage-area relation curves defined by surveys. The application of the stage to the capacity table gives the contents, from which the daily, monthly, or yearly change in contents is computed.

If the stage-capacity curve is subject to changes because of deposition of sediment in the reservoir, periodic resurveys of the reservoir are necessary to define new stage-capacity curves. During the period between reservoir surveys the computed contents may be increasingly in error due to gradual accumulation of sediment.

For some gaging stations there are periods when no gage-height record is obtained or the recorded gage height is so faulty that it cannot be used to compute daily discharge or contents. This happens when the recorder stops or otherwise fails to operate properly, intakes are plugged, the float is frozen in the well, or for various other reasons. For such periods the daily discharges are estimated on the basis of recorded range in stage, prior and subsequent records, discharge measurements, weather records, and comparison with records for other stations in the same or nearby basins. Likewise, daily contents may be estimated on the basis of operator's log, prior and subsequent records, inflow-outflow studies, and other information.

The data in this report generally comprise a description of the station and tabulations of daily and monthly figures. For gaging stations on streams or canals a table showing the daily discharge and monthly and yearly discharge is given. For gaging stations on lakes and reservoirs a monthly summary table of stage and contents or a table showing the daily contents is given. Tables of daily mean gage heights are included for some streamflow stations and for some reservoir stations. Records are published for the water year which begins on October 1 and ends on September 30.

The description of the gaging stations gives the location, drainage area, period of record, notations of revisions of previously published records, type and history of gages, general remarks, average discharge, and extremes of discharge or contents. The location of the gaging station and the drainage area are obtained from the most accurate maps available. River mileage, given under "LOCATION" for some stations, is that determined and used by the Corps of Engineers or other agencies. Periods for which there are published records for the present station or for stations generally equivalent to the present one are given under "PERIOD OF RECORD."

Previously published streamflow records of some stations have been found to be in error on the basis of data or information later obtained. Revisions of such records are usually published along with the current records in one of the annual or compilation reports. In order to make it easier to find such revised records, a paragraph headed "REVISED RECORDS" has been added to the description of all stations for which revised records have been published. Listed therein are all the reports in which revisions have been published, each followed by the water years for which figures are revised in that report. In listing the water years only one number is given; for instance, 1965 stands for the water year Oct.1, 1964, to September 30, 1965. If no daily, monthly, or annual figures of discharge are affected by the revision, the fact is brought out by notations after the year dates as follows: "(M)" means that only the instantaneous maximum discharge was revised; "(m)" that only the instantaneous minimum was revised; and "(P)" that only peak discharges were revised. If the drainage area has been revised, the report in which the revised figure was first published is given. It should be noted that for all stations for which cubic feet per second per square mile and runoff in inches are published, a revision of the drainage area necessitates corresponding revision of all figures based on the drainage area. Revised figures of cubic feet per second per square mile and runoff in inches resulting from a revision of the drainage area only are usually not published in the annual series of reports.

The type of gage currently in use; the datum of the present gage referred to National Geodetic Vertical Datum; and a condensed history of the types, locations, and datums of previous gages used during the period of record are given under "GAGE." National Geodetic Vertical Datum is explained in "DEFINITION OF TERMS" on page 5.

Information pertaining to the accuracy of the discharge records and to conditions which affect the natural flow of the gaging station is given under "REMARKS." For reservoir stations information on the dam forming the reservoir, the capacity, outlet works and spillway, and purpose and use of the reservoir is given under "REMARKS."

The average discharge for the number of years indicated is given under "AVERAGE DISCHARGE"; it is not given for stations having fewer than 5 complete years of record or for stations where changes in water development during the period of record cause the figure to have little significance. Under "EXTREMES" are given first, the extremes for the period of record, second, information available outside the period of record, and last, those for the current year. Unless otherwise qualified, the maximum discharge (or contents) is the instantaneous maximum corresponding to the crest stage obtained by use of a water-stage recorder (graphic or digital), a crest-stage gage, or a nonrecording gage read at the time of the crest. If the maximum gage height did not occur on the same day as the maximum discharge (or contents), it is given separately. Similarly, the minimum is the instantaneous minimum unless otherwise qualified. For some stations peak discharges are listed with "EXTREMES FOR THE CURRENT YEAR"; if they are, all independent peaks, including the maximum for the year, above the selected base with the time of occurrence and corresponding gage heights are published in tabular format. The base discharge, which is given in the table heading, is selected so that an average of about three peaks a year will be presented. Peak discharges are not published for any canals, ditches, drains, or for any stream for which the peaks are subject to substantial control by man. Time of day is expressed in 24-hour local standard time; for example, 12:30 a.m. is 0030, 1:30 p.m. is 1330. The minimums for these stations are published in a separate paragraph following the table of peaks.

The daily table for stream-gaging stations gives the mean discharge for each day and is followed by monthly and yearly summaries. In the monthly summary below the daily table, the line headed "TOTAL" gives the sum of the daily figures. The line headed "MEAN" gives the average flow in cubic feet per second during the month. The lines headed "MAX" and "MIN" give the maximum and minimum daily discharges, respectively, for the month. Discharge for the month also may be expressed in cubic feet per second per square mile (line headed "CFSM"), or in inches (line headed "IN."), or in acre-feet (line headed "AC-FT"). Figures for cubic feet per second per square mile and runoff in inches are omitted if there is extensive regulation or diversion, if the drainage area includes large noncontributing areas, or if the average annual rainfall over the drainage basin is usually less than 20 inches. In the yearly summary below the monthly summary, the figures shown are the appropriate daily discharges for the calendar and water years.

Footnotes to the table of daily discharges are introduced by the word "NOTE." Footnotes are used to indicate periods for which the discharge is computed or estimated by special methods because of no gage-height record, backwater from various sources, or other unusual conditions. Periods of no gage-height record are indicated if the period is continuous for a month or more or includes the maximum discharge for the year. Periods of backwater from an unusual source, of indefinite stage-discharge relation, or of any other unusual condition at the gage site are indicated only if they are a month or more in length and the accuracy of the records is affected. Days on which the stage-discharge relation is affected by ice are not indicated. The methods used in computing discharge for various unusual conditions have been explained in preceding paragraphs.

For most gaging stations on lakes and reservoirs the data presented comprise a description of the station and a monthly summary table of stage and contents. For some reservoirs a table showing daily contents or stage is given. A skeleton table of capacity at given stages is published for most reservoirs for which records are published on a daily basis, but is not published for reservoirs for which only monthly data are given.

Data collected at partial-record stations follow the information for continuous-record sites. Data for partial-record discharge stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations, and the second is a table of annual maximum stage and discharge at crest-stage stations. The tables of partial-record stations are followed by a listing of discharge measurements made at sites other than continuous-record or partial-record stations. Occasionally, a series of discharge measurements are made within a short time period to investigate the seepage gains or losses along a reach of a stream or to determine the low-flow characteristics of an area. Such measurements are also given in special tables following the tables of partial-record stations.

Accuracy of data

The accuracy of streamflow data depends primarily on (1) the stability of the stage-discharge relation or, if the control is unstable, the frequency of discharge measurements, and (2) the accuracy of observations of stage, measurements of discharge, and interpretation of records.

The station description under "REMARKS" states the degree of accuracy of the records. "Excellent" means that about 95 percent of the daily discharges are within 5 percent; "good" within 10 percent; and "fair" within 15 percent. "Poor" means that daily discharges have less than "fair" accuracy.

Figures of daily mean discharge in this report are shown to the nearest hundredth of a cubic foot per second for discharges of less than 1 cfs; to tenths between 1.0 and 10 cfs; to whole numbers between 10 and 1,000 cfs; and to 3 significant figures above 1,000 cfs. The number of significant figures used is based solely on the magnitude of the figure. The same rounding rules apply to discharge figures listed for partial-record stations.

Discharge at many stations, as indicated by the monthly mean, may not reflect natural runoff due to the effects of diversion, consumption, regulation by storage, increase or decrease in evaporation due to artificial causes, or to other factors. For such stations, figures of cubic feet per second per square mile and of runoff in inches are not published unless satisfactory adjustments can be made for diversions, for changes in contents of reservoirs, or for other changes incident to use and control. Evaporation from a reservoir is not included in the adjustments for changes in reservoir contents, unless it is so stated. Even at those stations where adjustments are made, large errors in computed runoff may occur if adjustments or losses are large in comparison with the observed discharge.

Other data available

Information of a more detailed nature than that published for most of the gaging stations, such as observations of water temperatures, discharge measurements, gage-height records, and rating tables, is on file in the district office. Also, most gaging-station records are available in computer-usable form and many statistical analyses have been made.

Information on the availability of unpublished data or statistical analyses may be obtained from the district office.

EXPLANATION OF WATER QUALITY RECORDS

Collection and examination of data

Surface-water samples for analyses usually are collected at or near gaging stations. The quality-of-water records are given immediately following the discharge records at these stations.

The descriptive heading for water-quality records gives the period of record for all water-quality data; the period of daily record for parameters that are measured on a daily basis (specific conductance, pH, dissolved oxygen, water temperature, sediment discharge, etc.); extremes for period of daily record; extremes for the current year; and general remarks.

Information pertaining to the accuracy of some water-quality records are preceeded by a "remark code." The following are explanations of "remark codes" found accompanying water-quality records: "E" estimated; "K" results based on colony outside the acceptable range (NON-IDEAL COLONY COUNT); "ND" not detected.

For ground-water records, no descriptive statements are given; however, the well number, depth of well, date of sampling and/or other pertinent data are given in the table containing the chemical analyses of the ground water.

Water analysis

Most methods for collecting and analyzing water samples are described in the U.S. Geolcgical Survey Techniques of Water Resources Investigations listed on a following page.

One sample can define adequately the water quality at a given time if the mixture of solutes throughout the stream cross section is homogeneous. However, the concentration of solutes at different locations in the cross section may vary widely with different rates of water discharge, depending on the source of material and the turbulence and mixing of the stream. Some streams must be sampled through several vertical sections to obtain a representative sample needed for an accurate mean concentration and for use in calculating load.

Chemical-quality data published in this report are considered to be the most representative values available for the stations listed. The values reported represent water-quality conditions at the time of sampling as much as possible, consistent with available sampling techniques and methods of analysis. In the rare case where an apparent inconsistency exists between a reported pH value and the relative abundance of carbon dioxide species (carbonate and bicarbonate), the inconsistency is the result of a slight uptake of carbon dioxide from the air by the sample between measurement of pH in the field and determination of carbonate and bicarbonate in the laboratory.

For chemical-quality stations equipped with digital monitors, the records consist of daily maximum, minimum, and mean values for each constituent measured and are based upon hourly punches beginning at 0100 hours and ending at 2400 hours for the day of record. More detailed records (hourly values) may be obtained from the district office.

Water temperature

Water temperatures are measured at most of the water-quality stations. In addition, water temperatures are taken at time of discharge measurements for water-discharge stations. For stations where water temperatures are taken manually once or twice daily, the water temperatures are taken at about the same time each day. Large streams have a small daily temperature change; shallow streams may have a daily range of several degrees and may follow closely the changes in air temperature. Some streams may be affected by waste-heat discharge.

At stations where recording instruments are used, either mean temperatures or maximum and minimum temperatures for each day are published.

Sediment

Suspended-sediment concentrations are determined from samples collected by using depth-integrating samplers. Samples usually are obtained at several verticals in the cross section, or a single sample may be obtained at a fixed point and a coefficient applied to determine the mean concentration in the cross sections.

During periods of rapidly changing flow or rapidly changing concentration, samples may have been collected more frequently (twice daily or, in some instances, hourly). The published sediment discharges for days of rapidly changing flow or concentration were computed by the subdivided day method (time-discharge weighted average). Therefore, for those days when the published sediment discharge value differs from the value computed as the product of discharge times mean concentration times 0.0027, the reader can assume that the sediment discharge for that day was computed by the subdivided day method. For periods when no samples are collected, daily loads of suspended sediment were estimated on the basis of water discharge, sediment concentrations observed immediately before and after the periods, and suspended-sediment loads for other periods of similar discharge.

At other stations, suspended-sediment samples are collected periodically at many verticals in the stream cross section. Although data collected periodically may represent conditions only at the time of observation, such data are useful in establishing seasonal relations between quality and streamflow in predicting long-term sediment-discharge characteristics of the stream.

In addition to the records of the quantities of suspended sediment, records of periodic measurements of the particle-size distribution of the suspended sediment and bed material are included.

EXPLANATION OF GROUND-WATER LEVEL RECORDS

Collection of the data

Only ground-water level data from a basic national network of observation wells are published herein. This basic network contains observation wells so located (figure 9) that the most significant data are obtained from the fewest wells in the most important aquifers.

Each well is identified by means of (1) a 15-digit number that is based on latitude and longitude, and (2) a local number that is provided for local needs. See figures 2 and 3.

Measurements are made in many types of wells under varying conditions of access and of different temperatures, hence neither the method of measurement nor the equipment can be standardized. At each observation well, however, the equipment and techniques used are those that will insure that measurements at each well are consistent.

Water-level measurements in this report are given in feet with reference to either mean sea level (msl) or land-surface datum (lsd). Mean sea level is the datum plane on which the national network of precise levels is based; land-surface datum is a datum plane that is approximately at land surface at each well. If known, the altitude of the lands-surface datum above mean sea level is given in the well description. The height of the measuring point (MP) above or below land-surface datum is given in each well description. Water levels in wells equipped with recording gages are reported for every fifth day and the end of each month (eom).

Water levels are reported to as many significant figures as can be justified by the local conditions. For example, in a measurement of a depth to water of several hundred feet, the error of determining the absolute value of the total depth to water may be a few tenths of a foot, whereas the error in determining the net change of water level between successive measurements may be only a hundredth or a few hundredths of a foot. For lesser depths to water, the accuracy is greater. Accordingly, most measurements are reported to a hundredth of a foot, but some are given only to a tenth of a foot or a larger unit.

PUBLICATIONS ON TECHNIQUES OF WATER-RESOURCES INVESTIGATIONS

Thirty-four manuals by the U.S. Geological Survey have been published to date in the series on techniques describing procedures for planning and executing specialized work in water-resources investigations. The material is grouped under major subject headings called books and is further divided into sections and chapters. For example, Section A of Book 3 (Applications of Hydraulics) is on surface water. The chapter, the unit of publication, is limited to a narrow field of subject matter. This format permits flexibility in revision and publication as the need arises. The reports listed below are for sale by the U.S. Geological Survey, Branch of Distribution, 1200 South Eads Street, Arlington, VA 22202 (authorized agent of the Superintendent of Documents, Government Printing Office).

NOTE: When ordering any of these publications, please give the title, book number, chapter number, and "U.S. Geological Survey Techniques of Water-Resources Investigations".

1-D1. *Water temperature--influential factors, field measurement, and data presentation*, by H. H. Stevens, Jr., J. F. Ficke, and G. F. Smoot: USGS--TWRI Book 1, Chapter D1. 1975. 65 pages.

1-D2. *Guidelines for collection and field analysis of ground-water samples for selected unstable constituents*, by W. W. Wood: USGS--TWRI Book 1, Chapter D2. 1976. 24 pages.

2-D1. *Application of surface geophysics to ground-water investigations*, by A. A. R. Zohdy, G. P. Eaton, and D. R. Mabey: USGS--TWRI Book 2, Chapter D1. 1974. 116 pages.

2-E1. *Application of borehole geophysics to water-resources investigations*, by W. S. Keys and L. M. MacCary: USGS--TWRI Book 2, Chapter E1. 1971. 126 pages.

3-A1. *General field and office procedures for indirect discharge measurements*, by M. A. Benson and Tate Dalrymple: USGS--TWRI Book 3, Chapter A1. 1967. 30 pages.

3-A2. *Measurement of peak discharge by the slope-area method*, by Tate Dalrymple and M. A. Benson. USGS--TWRI Book 3, Chapter A2. 1967. 12 pages.

3-A3. *Measurement of peak discharge at culverts by indirect methods*, by G. L. Bodhaine: USGS--TWRI Book 3, Chapter A3. 1968. 60 pages.

3-A4. *Measurement of peak discharge at width contractions by indirect methods*, by H. F. Matthai: USGS--TWRI Book 3, Chapter A4. 1967. 44 pages.

3-A5. *Measurement of peak discharge at dams by indirect methods*, by Harry Hulsing: USGS--TWRI Book 3, Chapter A5. 1967. 29 pages.

3-A6. *General procedure for gaging streams*, by R. W. Carter and Jacob Davidian: USGS--TWRI Book 3, Chapter A6. 1968. 13 pages.

3-A7. *Stage measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A7. 1968. 28 pages.

3-A8. *Discharge measurements at gaging stations*, by T. J. Buchanan and W. P. Somers: USGS--TWRI Book 3, Chapter A8. 1969. 65 pages.

3-A11. *Measurement of discharge by moving-boat method*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 3, Chapter A11. 1969. 22 pages.

3-B1. *Aquifer-test design, observation, and data analysis*, by R. W. Stallman: USGS--TWRI Book 3, Chapter B1. 1971. 26 pages.

3-B2. *Introduction to ground-water hydraulics, a programed text for self-instruction*, by G. D. Bennett: USGS--TWRI Book 3, Chapter B2. 1976. 172 pages.

3-C1. *Fluvial sediment concepts*, by H. P. Guy: USGS--TWRI Book 3, Chapter C1. 1970. 55 pages.

3-C2. *Field methods for measurement of fluvial sediment*, by H. P. Guy and V. W. Norman: USGS--TWRI Book 3, Chapter C2. 1970. 59 pages.

3-C3. *Computation of fluvial-sediment discharge*, by George Porterfield: USGS--TWRI Book 3, Chapter C3. 1972. 66 pages.

4-A1. *Some statistical tools in hydrology*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A1. 1968. 39 pages.

4-A2. *Frequency curves*, by H. C. Riggs: USGS--TWRI Book 4, Chapter A2. 1968. 15 pages.

4-B1. *Low-flow investigations*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B1. 1972. 18 pages.

4-B2. *Storage analyses for water supply*, by H. C. Riggs and C. H. Hardison: USGS--TWRI Book 4, Chapter B2. 1973. 20 pages.

4-B3. *Regional analyses of streamflow characteristics*, by H. C. Riggs: USGS--TWRI Book 4, Chapter B3. 1973. 15 pages.

4-D1. *Computation of rate and volume of stream depletion by wells*, by C. T. Jenkins: USGS--TWRI Book 4, Chapter D1. 1970. 17 pages.

5-A1. *Methods for determination of inorganic substances in water and fluvial sediments*, by M. W. Skougstad and others, editors: USGS--TWRI Book 5, Chapter A1. 1979. 626 pages.

5-A2. *Determination of minor elements in water by emission spectroscopy*, by P. R. Barnett and E. C. Mallory, Jr.: USGS--TWRI Book 5, Chapter A2. 1971. 31 pages.

5-A3. *Methods for analysis of organic substances in water*, by D. F. Goerlitz and Eugene Brown: USGS--TWRI Book 5, Chapter A3. 1972. 40 pages.

5-A4. *Methods for collection and analysis of aquatic biological and microbiological samples*, edited by P. E. Greeson, T. A. Ehlke, G. A. Irwin, B. W. Lium, and K. V. Slack: USGS--TWRI Book 5, Chapter A4. 1977. 332 pages.

5-A5. *Methods for determination of radioactive substances in water and fluvial sediments*, by L. L. Thatcher, V. J. Janzer, and K. W. Edwards: USGS--TWRI Book 5, Chapter A5. 1977. 95 pages.

5-C1. *Laboratory theory and methods for sediment analysis*, by H. P. Guy: USGS--TWRI Book 5, Chapter C1. 1969. 58 pages.

7-C1. *Finite difference model for aquifer simulation in two dimensions with results of numerical experiments*, by P. C. Trescott, G. F. Pinder, and S. P. Larson: USGS--TWRI Book 7, Chapter C1. 1976. 116 pages.

7-C2. *Computer model of two-dimensional solute transport and dispersion in ground water*, by L. F. Konikow and J. D. Bredehoeft: USGS--TWRI Book 7, Chapter C2. 1978. 90 pages.

8-A1. *Methods of measuring water levels in deep wells*, by M. S. Garber and F. C. Koopman: USGS--TWRI Book 8, Chapter A1. 1968. 23 pages.

8-B2. *Calibration and maintenance of vertical-axis type current meters*, by G. F. Smoot and C. E. Novak: USGS--TWRI Book 8, Chapter B2. 1968. 15 pages.

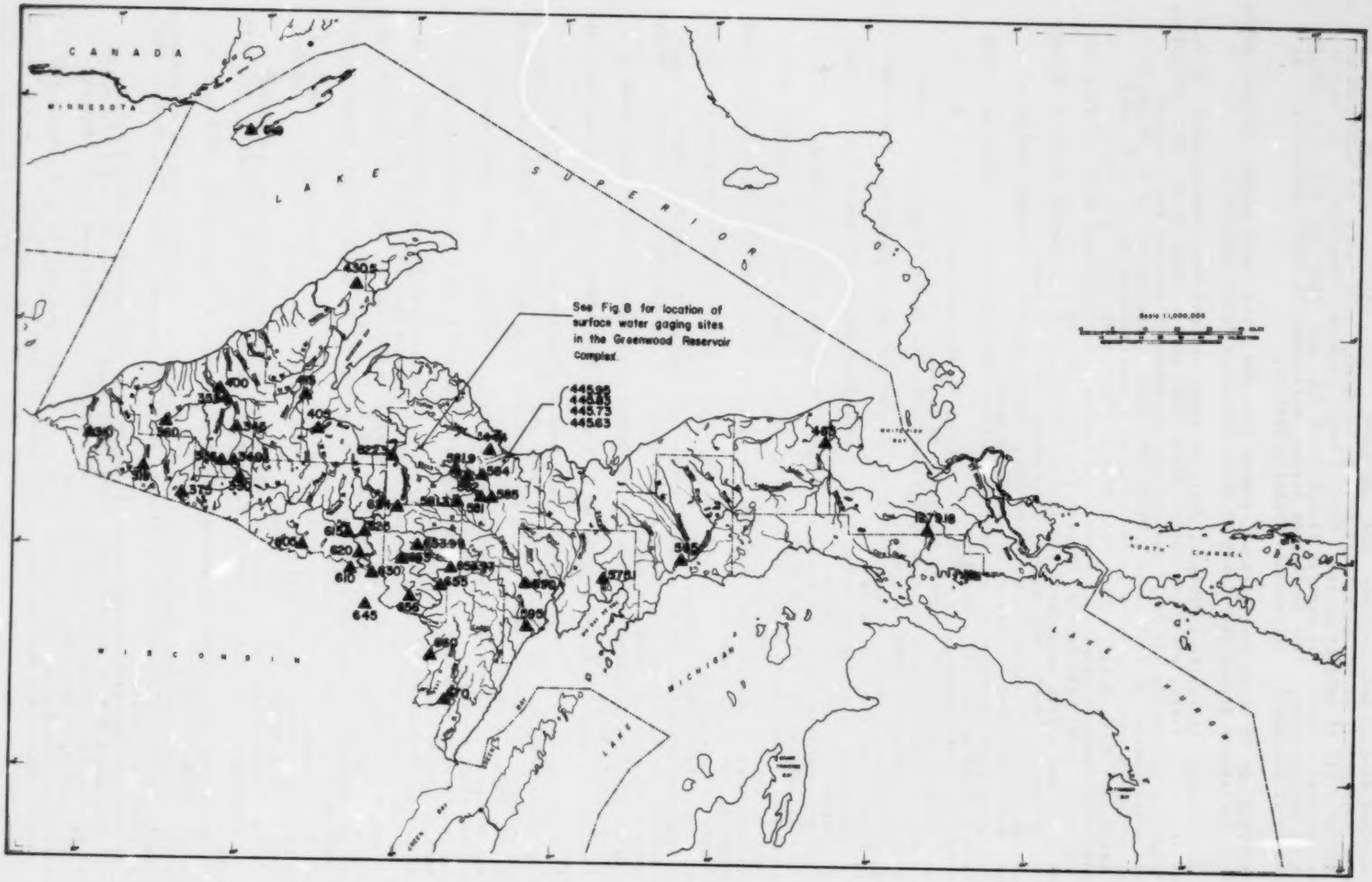

CANADA
MINNESOTA
LAKE SUPERIOR
WISCONSIN
LAKE MICHIGAN
LAKE HURON
NORTH CHANNEL
WHITEFISH BAY
GREEN BAY
Scale 1:1,000,000
See Fig. 8 for location of surface water gaging sites in the Greenwood Reservoir complex.
445.92
445.85
445.73
445.63
430.5
400
405
346
360
375
390
610
620
625
630
645
655
656
660
670
584
585
591
595
545
12.79.16

FIGURE 4.--Map showing identification number and location of gaging stations in Upper Peninsula of Michigan.

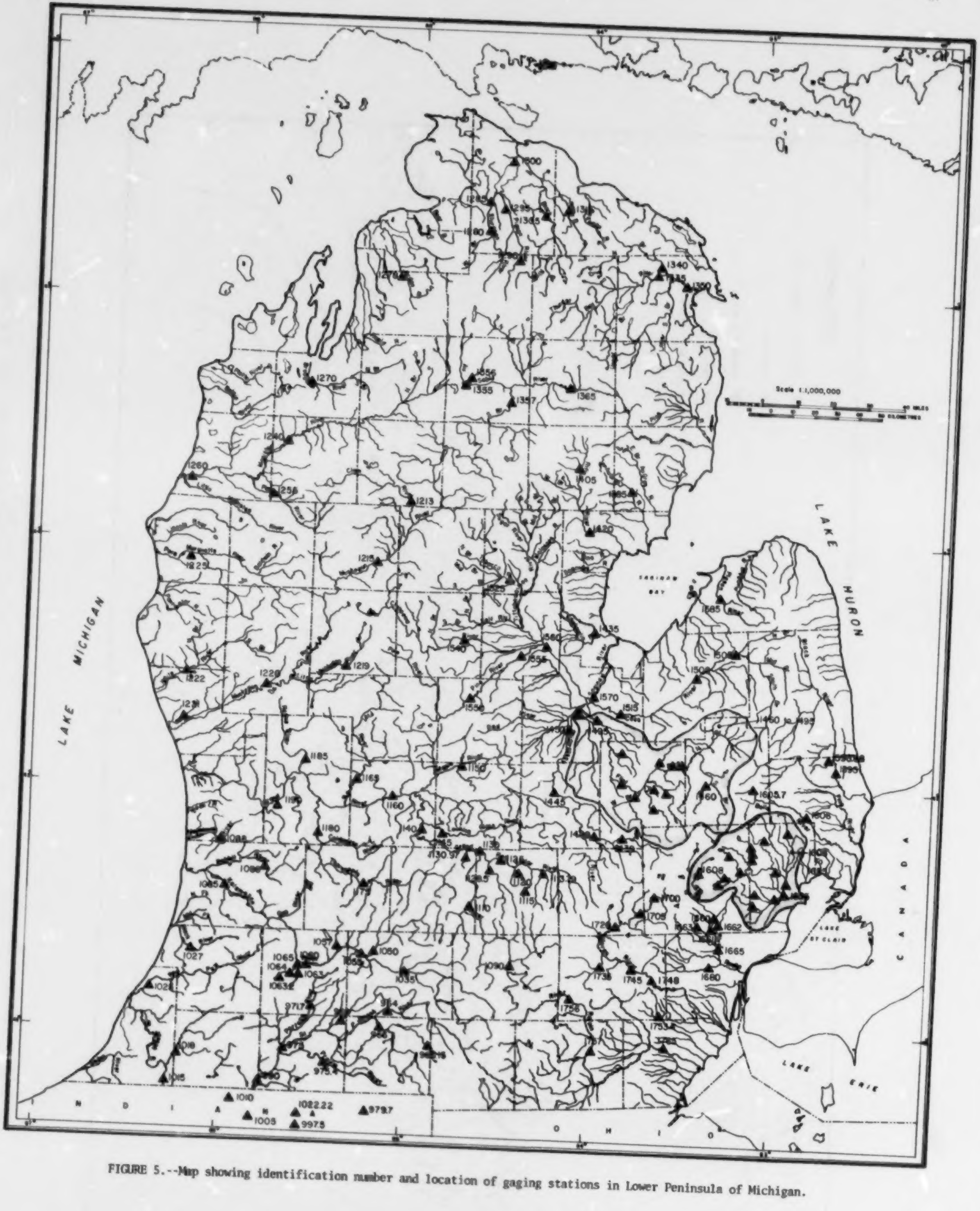

LAKE MICHIGAN
LAKE HURON
SAGINAW BAY
LAKE ST CLAIR
LAKE ERIE
CANADA
I N D I A N A
O H I O
Scale 1:1,000,000
1340
1270
1356
1355
1357
1365
1240
1260
1255
1213
1405
1420
1225
1218
1222
1228
1219
1185
1165
1160
1150
1180
1570
1515
1445
1505
1662
1665
1660
1738
1745
1748
1755
1705
1700
1608
1027
1016
1015
1010
1005
1082.22
997.5
979.7
1080
1035
1065
1063
1090

FIGURE 5.--Map showing identification number and location of gaging stations in Lower Peninsula of Michigan.

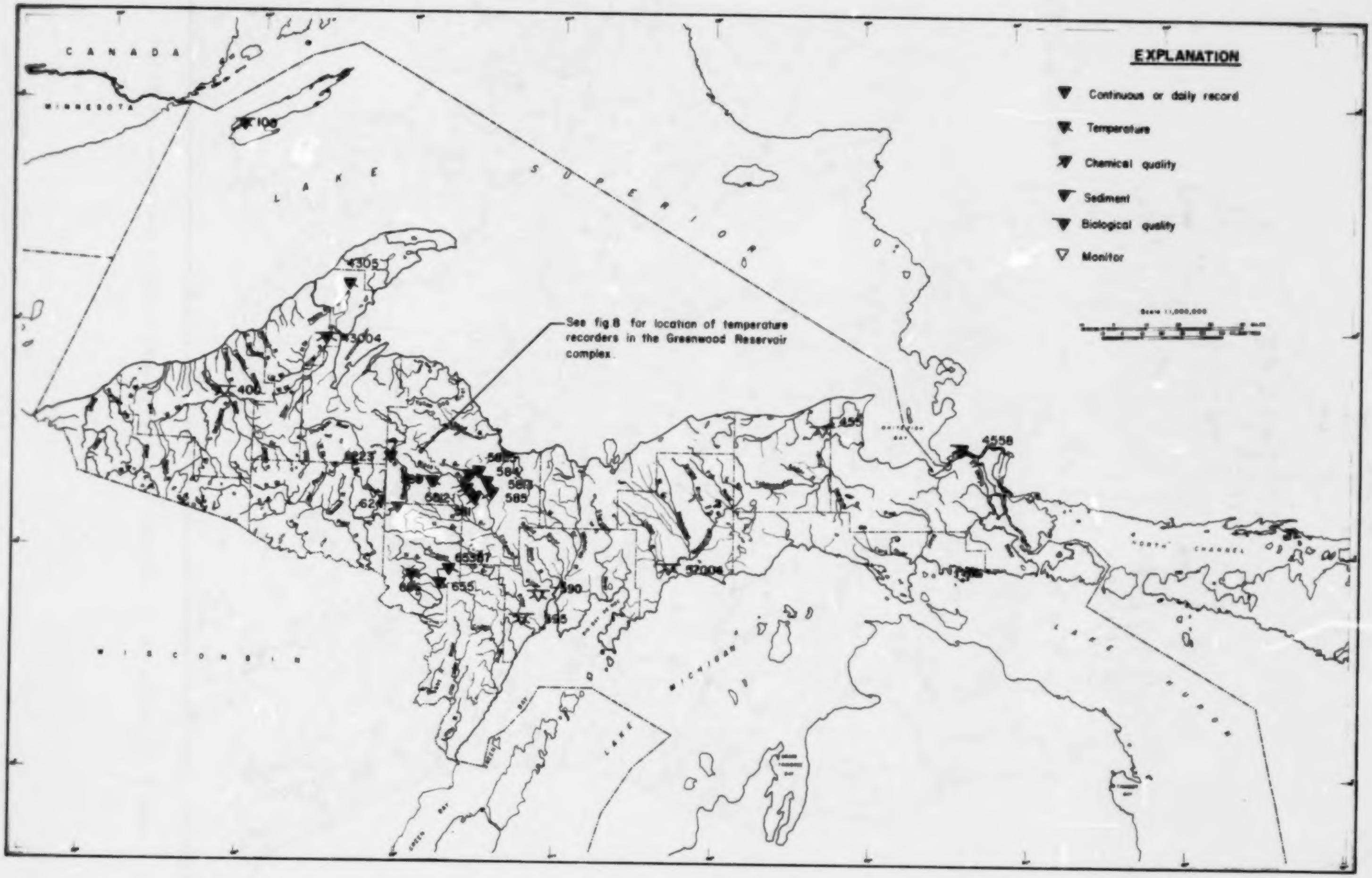

CANADA
MINNESOTA
LAKE SUPERIOR
EXPLANATION
Continuous or daily record
Temperature
Chemical quality
Sediment
Biological quality
Monitor
Scale 1:1,000,000
See fig.8 for location of temperature recorders in the Greenwood Reservoir complex.
108
4305
3004
400
623
624
582
584
583
585
65367
655
590
595
52004
455
4558
NORTH CHANNEL
WISCONSIN
LAKE MICHIGAN
LAKE HURON
GREEN BAY

FIGURE 6.--Map showing identification number and location of water-quality stations in Upper Peninsula of Michigan.

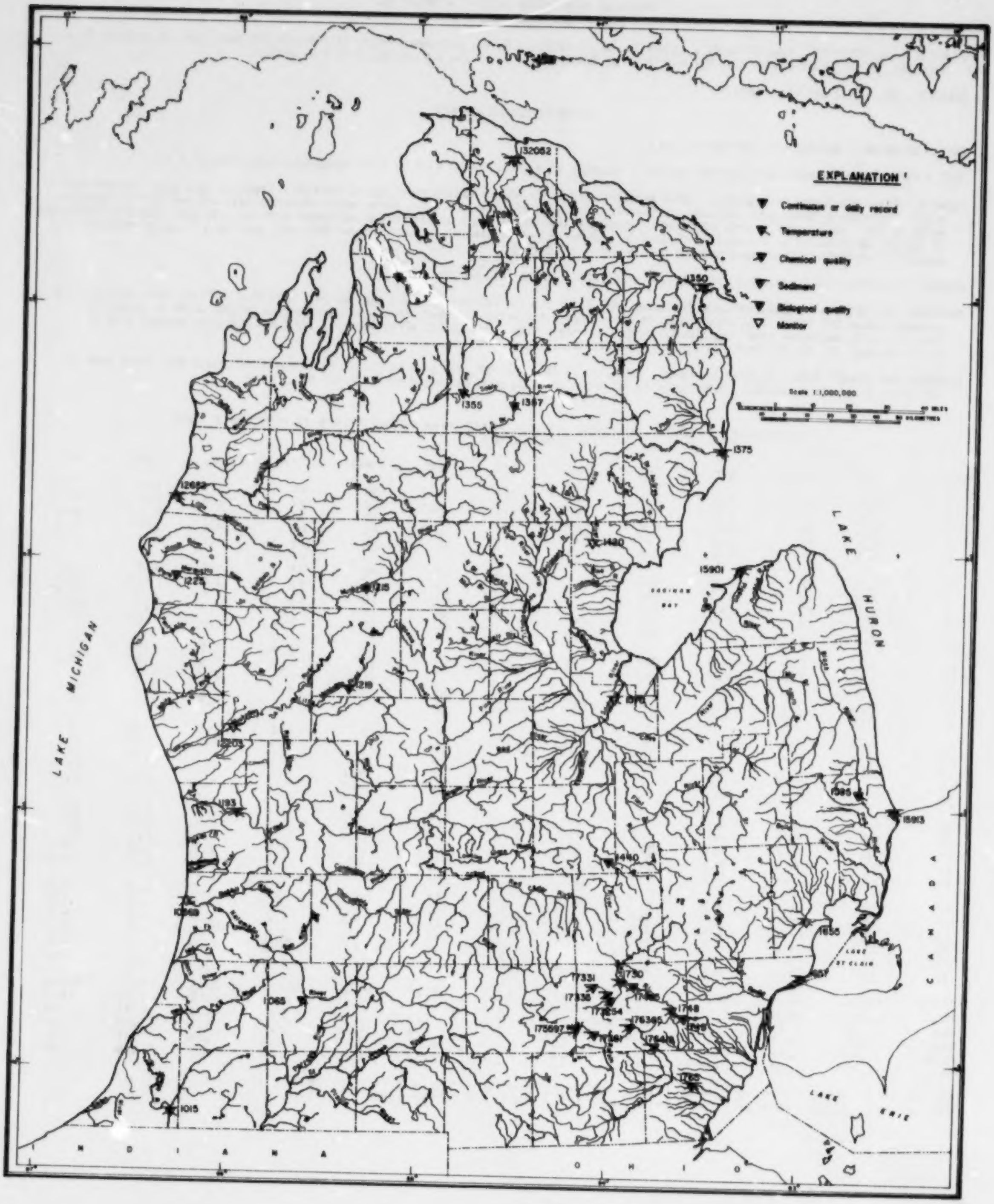

EXPLANATION
Continuous or daily record
Temperature
Chemical quality
Sediment
Biological quality
Monitor
Scale 1:1,000,000
LAKE MICHIGAN
LAKE HURON
SAGINAW BAY
LAKE ST CLAIR
LAKE ERIE
CANADA
INDIANA
OHIO
132082
1350
1355
1367
1375
1420
15901
1193
1440
15913
1655
1730
17331
1748
1065
1015

FIGURE 7.--Map showing identification number and location of water-quality stations in Lower Peninsula of Michigan.

04001000 WASHINGTON CREEK AT WINDIGO, MI
(Hydrologic bench-mark station)

LOCATION.--Lat 47°55'23", long 89°08'42", in NW¼ sec.28, T.64 N., R.38 W., Keweenaw County, Isle Royale National Park, Hydrologic Unit 04020300, on left bank 0.8 mi (1.3 km) northeast of Windigo, and 35 mi (56 km) southwest of Rock Harbor.

DRAINAGE AREA.--13.2 mi² (34.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 605 ft (184 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records fair. ERTS satellite telemeter and recording rain gage at station. Capacity rain gage located near mouth. Hydrologic bench-mark stations are installed in specially selected areas where water resources have not yet been affected by works of man. Continuous records of natural hydrologic conditions, such as streamflow and water quality, will make possible assessment of changes which occur as a result of changes in climate and other natural factors. These data will provide a frame of reference against which hydrologic changes wrought by man may be evaluated.

AVERAGE DISCHARGE.--16 years, 17.7 ft³/s (0.501 m³/s), 18.21 in/yr (463 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 480 ft³/s (13.6 m³/s) May 1, 1972, gage height, 6.82 ft (2.079 m), from rating curve extended above 160 ft³/s (4.53 m³/s) based on runoff characteristics of nearby stations; maximum gage height, 6.88 ft (2.097 m) Jan. 13, 1975, backwater from ice; minimum daily discharge, 0.44 ft³/s (0.012 m³/s) Aug. 25, 1977; minimum gage height, 2.55 ft (0.777 m) Aug. 29, 30, 31, Sept. 2, 3, 7, 9, 10, 11, 12, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 148 ft³/s (4.19 m³/s) Apr. 21, gage height, 4.99 ft (1.521 m), only peak above base of 110 ft³/s (3.12 m³/s); minimum, 0.80 ft³/s (0.023 m³/s) Aug. 17, gage height, 2.69 ft (0.820 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.8	39	7.8	3.3	2.4	1.9	6.0	36	27	4.4	1.1	7.7
2	4.6	31	7.0	3.2	2.3	1.8	8.0	32	35	3.6	1.1	10
3	3.9	25	7.1	3.0	2.3	1.6	11	28	28	3.0	3.1	6.8
4	3.7	21	6.5	2.9	2.3	1.5	16	25	21	2.6	1.9	5.9
5	3.3	18	7.0	2.8	2.3	1.5	26	22	16	5.6	1.7	4.8
6	3.0	15	7.2	2.8	2.2	1.5	49	20	13	4.7	1.2	4.4
7	2.7	13	6.6	3.1	2.2	1.6	65	19	11	3.8	.99	3.4
8	2.5	12	5.7	3.1	2.2	1.9	84	17	11	3.4	.98	4.0
9	3.3	11	5.5	3.1	2.2	2.6	89	16	9.7	2.7	1.1	28
10	3.5	9.7	5.4	3.1	2.1	2.9	89	16	8.0	2.3	.95	18
11	3.3	8.4	5.5	3.2	2.1	2.7	46	21	6.9	2.1	.91	12
12	3.9	7.8	5.0	3.2	2.1	2.5	32	18	5.9	1.9	.87	9.4
13	3.6	7.3	4.8	3.2	2.0	2.2	26	16	5.5	2.0	1.0	27
14	3.3	7.1	4.6	3.2	2.0	2.1	24	15	5.4	2.0	1.3	38
15	3.1	6.7	4.5	3.2	2.0	2.0	22	13	6.1	2.3	1.0	26
16	3.2	7.0	4.2	3.2	2.0	1.9	25	12	5.0	3.9	.90	20
17	3.1	8.4	3.7	3.9	1.9	2.0	29	10	4.4	5.3	.85	14
18	3.1	8.5	3.6	3.9	1.9	1.9	50	9.8	3.9	4.3	1.2	13
19	22	9.3	3.8	4.0	1.9	1.8	85	9.1	3.6	5.1	1.1	13
20	23	11	3.7	3.9	1.9	2.1	120	8.3	3.3	4.2	1.2	23
21	17	11	3.8	3.5	1.9	2.0	125	7.6	2.9	3.8	1.9	17
22	20	9.9	3.9	3.2	1.9	1.9	123	7.1	2.6	4.4	1.9	14
23	36	9.2	4.0	3.1	1.9	1.9	100	6.6	2.4	3.6	1.3	11
24	27	8.6	4.0	3.0	1.9	1.9	65	6.0	2.1	3.0	1.5	9.7
25	22	8.1	4.0	2.8	1.9	1.9	64	5.3	1.9	2.6	1.6	9.2
26	19	10	3.8	2.7	1.9	2.0	59	4.7	1.6	2.0	1.3	8.0
27	20	14	3.7	2.6	1.9	2.2	54	4.0	1.5	1.7	1.1	7.0
28	28	12	3.4	2.6	1.9	2.4	47	3.8	5.6	1.9	1.0	6.2
29	27	9.8	3.4	2.5	1.9	3.0	43	3.6	6.4	1.8	1.0	5.7
30	27	9.2	3.4	2.4	---	3.7	39	12	5.2	1.4	10	5.4
31	29	---	3.4	2.4	---	4.9	---	32	---	1.3	8.2	---
TOTAL	376.9	378.0	150.0	96.1	59.4	67.8	1621.0	455.9	261.9	96.7	55.25	381.6
MEAN	12.2	12.6	4.84	3.10	2.05	2.19	54.0	14.7	8.73	3.12	1.78	12.7
MAX	36	39	7.8	4.0	2.4	4.9	125	36	35	5.6	10	38
MIN	2.5	6.7	3.4	2.4	1.9	1.5	6.0	3.6	1.5	1.3	.85	3.4
CFSM	.92	.96	.37	.24	.16	.17	4.09	1.11	.66	.24	.14	.96
IN.	1.06	1.07	.42	.27	.17	.19	4.57	1.28	.74	.27	.16	1.08

CAL YR 1979 TOTAL 5726.89 MEAN 15.7 MAX 261 MIN .94 CFSM 1.19 IN 16.14
WTR YR 1980 TOTAL 4000.55 MEAN 10.9 MAX 125 MIN .85 CFSM .83 IN 11.27

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1965 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 20, 1964.

REMARKS.--In addition to the temperature recorder record, samples were collected approximately bimonthly. Temperature recorder clock stopped Oct. 11-23 (range in temperature 2.5 to 8.5°C), Mar. 5 to May 21 (range in temperature 0.0 to 15.0°C). Temperature recorder malfunctioned Nov. 8, 9. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.0°C July 26, 30, 31, 1970, July 18, Aug. 1, 1975, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5°C June 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, TOTAL, IMMED. (COLS. PER 100 ML)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
OCT												
24...	1500	28	73	7.5	2.5	12.7	95	K180	<1	31	45	9
FEB												
01...	1315	2.4	152	7.6	.0	13.4	94	K134	K1	<1	70	4
MAR												
05...	1400	1.6	164	7.7	.0	13.1	92	99	K1	K1	76	2
MAY												
21...	1400	7.4	95	7.7	14.0	9.7	96	88	62	K15	47	6
JUL												
23...	1300	3.6	147	7.6	15.5	7.9	84	112	K21	23	73	2
SEP												
17...	1300	14	98	7.3	9.0	10.2	90	48	K3	28	52	11

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT												
24...	12	3.6	0	2.1	.1	9	.5	--	--	36	--	6.5
FEB												
01...	19	5.5	--	3.7	.2	14	.4	80	0	66	3.2	7.2
MAR												
05...	20	5.3	--	4.7	.2	12	.4	--	--	74	--	7.0
MAY												
21...	12	4.1	0	3.1	.2	13	.3	--	--	41	--	6.1
JUL												
23...	25	5.6	--	3.5	.2	9	.4	--	--	71	--	3.5
SEP												
17...	14	4.2	--	2.3	.1	9	.3	56	0	41	4.0	3.2

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)
OCT										
24...	2.2	.0	10	88	--	6.65	.04	.04	.010	.03
FEB										
01...	4.0	.1	14	112	94	.71	.09	.09	.010	.03
MAR										
05...	5.3	.0	14	121	103	.52	.15	.15	.040	.12
MAY										
21...	2.2	.0	8.7	92	62	1.45	.02	.04	.040	.12
JUL										
23...	3.1	.1	11	133	59	1.29	.06	.04	.010	.03
SEP										
17...	1.8	.1	12	85	63	3.27	.01	.02	.000	.00

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)
OCT										
24...	1500	1	1	0	<2	2	--	1	20	3
MAY										
21...	1400	1	1	100	10	4	0	<1	20	9

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
OCT									
24...	<3	3	380	270	--	10	<4	10	10
MAY									
21...	<3	3	270	170	2	0	<4	20	9

DATE	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	VANA-DIUM, DIS-SOLVED (UG/L AS V)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)
OCT									
24...	<10	0	0	0	0	22	<6.0	10	<4
MAY									
21...	<10	0	0	0	0	25	<6.0	10	<4

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L)
OCT									
24...	1500	<1.1	<.4	1.7	<.4	1.5	<.4	.05	.06

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)
OCT											
24...	1500	.0	7	.00	.0	.0	0	.00	.0	.00	.0

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDOSULFAN, TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	HEPTACHLOR, TOTAL (UG/L)
OCT										
24...	.00	.0	.00	.00	.0	.00	.00	.0	.00	.00

DATE	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL TRITHION, TOTAL (UG/L)
OCT										
24...	.0	.00	.0	.00	.0	.00	.00	.0	.00	.00

DATE	NAPHTHALENES, POLYCHLOR. TOTAL (UG/L)	MIREX, TOTAL (UG/L)	PARATHION, TOTAL (UG/L)	PERTHANE TOTAL (UG/L)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
OCT										
24...	.00	.00	.00	.00	0	0	.00	.00	.00	.00

04001000 WASHINGTON CREEK AT WINDIGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	9.5	9.5	4.5	4.5	.0	.0	.0	.0	.0	.0	.0	.0
2	9.5	9.0	4.5	4.0	.0	.0	.0	.0	.0	.0	.0	.0
3	9.5	9.0	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0
4	9.5	8.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
5	9.0	8.5	3.0	3.0	.0	.0	.0	.0	.0	.0	---	---
6	7.5	6.5	3.0	2.5	.0	.0	.0	.0	.0	.0	---	---
7	6.5	6.0	2.5	2.5	.0	.0	.0	.0	.0	.0	---	---
8	6.0	5.5	2.5	---	.0	.0	.0	.0	.0	.0	---	---
9	5.5	5.0	---	.0	.0	.0	.0	.0	.0	.0	---	---
10	5.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	---	---
11	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
12	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
13	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
14	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
15	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
16	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
17	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
18	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
19	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
20	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
21	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
22	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
23	---	---	.0	.0	.0	.0	.0	.0	.0	.0	---	---
24	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	---	---
25	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	---	---
26	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	---	---
27	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0	---	---
28	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0	---	---
29	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0	---	---
30	3.0	3.0	.0	.0	.0	.0	.0	.0	---	---	---	---
31	4.5	3.0	---	---	.0	.0	.0	.0	---	---	---	---
MONTH					.0	.0	.0	.0	.0	.0		

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1			---	---	13.5	12.0	18.0	14.0	20.0	16.5	14.5	14.0
2			---	---	12.5	11.5	16.5	13.0	18.5	16.5	14.5	13.5
3			---	---	15.0	12.0	18.0	14.0	18.0	15.0	14.5	13.5
4			---	---	15.5	12.5	17.5	15.0	17.5	16.0	15.0	14.5
5			---	---	14.5	13.5	17.5	14.5	18.5	16.0	15.0	14.0
6			---	---	15.0	13.5	17.0	13.5	19.0	15.0	15.0	12.5
7			---	---	14.5	12.5	17.0	15.5	18.5	16.5	15.5	13.0
8			---	---	12.5	10.5	18.5	15.0	19.5	16.5	15.5	13.0
9			---	---	13.5	10.5	18.5	15.5	18.5	15.5	15.0	13.5
10			---	---	13.0	10.0	18.5	15.5	17.5	16.5	14.0	12.0
11			---	---	14.5	10.5	19.0	16.0	18.0	16.0	13.0	12.0
12			---	---	14.5	12.0	18.0	16.0	17.5	14.5	13.0	11.0
13			---	---	18.0	14.0	18.0	15.0	17.5	15.5	11.0	11.0
14			---	---	17.5	13.5	18.5	17.0	18.0	16.0	11.5	11.0
15			---	---	15.0	11.5	19.5	17.0	17.0	14.5	11.5	11.0
16			---	---	14.5	11.0	19.5	17.0	16.5	13.0	11.0	11.0
17			---	---	14.0	12.0	18.5	14.5	15.5	15.5	11.0	9.0
18			---	---	13.5	11.0	18.0	16.0	18.0	15.5	9.5	8.5
19			---	---	15.0	10.5	17.0	14.5	17.0	15.5	9.5	8.5
20			---	---	15.5	11.5	17.0	16.0	17.0	15.5	9.0	8.5
21			---	---	16.0	12.5	17.0	16.5	17.0	16.5	9.0	9.0
22			16.5	12.5	17.0	13.5	18.5	15.5	16.5	14.0	10.0	9.0
23			16.5	13.0	18.0	14.0	18.0	15.0	16.5	15.0	9.5	8.5
24			17.5	13.0	19.5	15.5	18.5	16.0	16.5	15.5	8.5	8.0
25			17.0	14.0	20.5	17.0	18.5	16.5	17.0	16.0	8.5	7.5
26			15.0	12.0	19.0	10.5	17.5	14.0	17.0	15.5	7.5	6.5
27			15.0	11.5	18.5	14.5	17.5	14.0	17.0	15.0	7.5	7.0
28			16.0	12.0	15.5	13.0	17.5	16.0	16.0	13.0	7.5	6.5
29			15.5	13.0	13.5	12.5	18.5	14.5	17.0	15.0	9.0	7.0
30			15.0	11.5	15.5	13.0	18.5	15.5	17.0	15.0	9.0	8.5
31			14.5	11.0	---	---	20.0	16.5	15.5	13.5	---	---
MONTH					20.5	10.0	20.0	13.0	20.0	13.0	15.5	6.5

04031000 BLACK RIVER NEAR BESSEMER, MI

LOCATION.--Lat 46°30'41", long 90°04'28", in NE¼ SE¼ sec.32, T.48 N., R.46 W., Gogebic County, Hydrologic Unit 04020101, on right bank 450 ft (137 m) downstream from bridge on county highway, 500 ft (152 m) downstream from Powder Mill Creek, and 2.5 mi (4.0 km) northwest of Bessemer.

DRAINAGE AREA.--200 mi² (518 km²).

PERIOD OF RECORD.--October 1954 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,154.3 ft (351.83 m) National Geodetic Vertical Datum of 1929 (levels by registered surveyor).

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1967, flow included some ground water pumped from mines at Bessemer. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 234 ft³/s (6.627 m³/s), 15.89 in/yr (404 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,800 ft³/s (419 m³/s) Apr. 24, 1960, gage height, 14.27 ft (4.349 m), from floodmark, from rating curve extended above 5,300 ft³/s (150 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 6.8 ft³/s (0.19 m³/s) Sept. 25, Oct. 1-3, 1976; minimum gage height, 0.36 ft (0.110 m) Sept. 9, 1970.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,500 ft³/s (42.5 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 8	0100	2,710	76.7	6.84	2.085	Apr. 20	0300	*2,760	78.2	*6.92	2.109

Minimum discharge, 20 ft³/s (0.57 m³/s) July 10, 12, 13, 14; minimum gage height, 0.57 ft (0.174 m) July 13, 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	550	125	66	73	64	300	247	53	28	53	186
2	35	481	120	65	72	64	350	223	73	26	49	176
3	35	414	120	65	70	64	450	196	67	25	43	235
4	37	354	115	66	69	64	638	175	59	24	47	561
5	39	309	115	66	68	65	874	156	54	27	52	470
6	46	269	110	67	67	66	1200	141	54	25	46	334
7	63	226	105	68	65	66	1900	127	50	24	50	257
8	60	208	105	70	65	67	2400	120	47	22	52	221
9	120	195	100	70	65	68	1620	112	47	22	49	766
10	172	180	100	73	64	69	1260	108	44	21	44	441
11	166	170	97	77	64	69	1060	128	40	23	62	282
12	170	160	95	83	63	70	928	116	36	22	64	222
13	175	150	95	90	63	70	757	110	38	21	61	350
14	166	145	94	100	63	70	642	99	45	35	152	493
15	177	140	92	115	64	72	638	92	42	33	147	419
16	175	130	90	120	64	75	618	84	37	33	105	343
17	157	135	90	120	65	78	955	79	34	43	87	265
18	144	128	87	120	65	83	1700	71	36	64	77	249
19	208	159	85	120	65	90	2380	66	35	105	73	239
20	226	208	85	115	66	100	2570	60	33	190	234	504
21	206	192	83	115	66	98	2060	56	33	219	1230	912
22	509	184	82	110	66	95	1670	50	40	191	944	851
23	1110	177	80	105	66	92	1250	47	34	153	645	635
24	932	170	78	100	66	90	914	43	30	118	613	533
25	748	152	78	97	65	92	726	38	28	136	704	464
26	602	155	77	93	65	98	594	37	27	120	565	405
27	516	145	75	90	65	110	481	36	27	101	410	326
28	610	140	73	87	65	125	390	35	29	89	311	261
29	562	135	72	84	64	150	334	33	31	89	242	220
30	486	130	70	80	---	180	295	43	29	79	213	186
31	436	---	67	77	---	240	---	66	---	66	195	---
TOTAL	9116	6289	2860	2774	1908	2804	31954	2994	1232	2174	7599	11804
MEAN	294	210	92.3	89.5	65.8	90.5	1065	96.6	41.1	70.1	245	393
MAX	1110	550	125	120	73	240	2570	247	73	219	1230	912
MIN	28	128	67	65	63	64	295	33	27	21	43	176
CFSM	1.47	1.05	.46	.45	.33	.45	5.33	.48	.21	.35	1.23	1.97
IN.	1.70	1.17	.53	.52	.35	.52	5.94	.56	.23	.40	1.41	2.20

CAL YR 1979 TOTAL 92045 MEAN 252 MAX 3560 MIN 21 CFSM 1.26 IN 17.12
WTR YR 1980 TOTAL 83508 MEAN 228 MAX 2570 MIN 21 CFSM 1.14 IN 15.53

04031500 PRESQUE ISLE RIVER AT MARENICSO, MI

LOCATION.--Lat 46°22'20", long 89°41'32", in SE¼ NW¼ sec.21, T.46 N., R.43 W., Gogebic County, Hydrologic Unit 04020101, on left bank 0.3 mi (0.5 km) upstream from highway bridge in Marenisco, and 1.5 mi (2.4 km) downstream from confluence of East and West Branches.

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--February 1945 to current year.

REVISED RECORDS.--WSP 1707: 1954. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,489.30 ft (453.939 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 27, 1949, nonrecording gage at site 0.3 mi (0.5 km) downstream at different datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Feb. 5 to Mar. 19, which are fair. Occasional regulation for lake or pond levrl control at several locations in the headwaters. Since 1959, occasional regulation by Presque Isle Flooding Reservoir, usable capacity, about 3,000 acre-ft (3.7 hm³), 2.5 mi (4.0 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 177 ft³/s (5.013 m³/s), 14.06 in/yr (357 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,520 ft³/s (99.7 m³/s) Apr. 25, 1960, gage height, 11.25 ft (3.429 m); minimum observed, 13 ft³/s (0.37 m³/s) Sept. 30, 1948, gage height, 2.25 ft (0.686 m), site and datum then is use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 852 ft³/s (24.1 m³/s) Aug. 22, gage height, 6.93 ft (2.112 m); minimum, 40 ft³/s (1.13 m³/s) July 10, gage height, 3.32 ft (1.012 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	333	115	96	98	83	150	212	438	57	85	183
2	59	321	105	95	98	82	165	183	360	53	76	187
3	62	282	120	93	98	80	175	179	284	50	70	217
4	63	252	130	92	100	80	190	169	213	47	69	307
5	62	231	140	90	100	78	226	157	170	49	77	304
6	67	215	130	90	100	78	286	150	154	50	70	264
7	80	198	125	90	100	78	438	142	140	50	73	218
8	81	192	120	90	98	78	593	139	142	47	75	190
9	89	211	120	92	95	78	629	136	126	44	72	266
10	97	182	115	94	95	78	588	130	118	42	71	234
11	97	165	115	95	95	78	513	141	103	48	80	189
12	101	155	115	97	94	78	459	128	94	47	79	168
13	104	145	110	100	93	78	396	111	89	47	73	221
14	103	139	110	100	93	78	345	109	95	68	102	320
15	111	139	105	105	92	78	314	107	91	77	94	316
16	117	135	105	110	92	80	296	104	86	74	80	273
17	100	138	100	115	92	80	317	100	79	75	73	231
18	94	137	100	115	92	82	417	96	75	103	66	200
19	101	150	105	120	92	84	539	97	75	156	75	180
20	115	155	105	115	90	86	641	96	71	208	159	205
21	140	158	105	115	90	90	658	92	71	237	707	333
22	256	160	110	110	90	90	614	86	77	233	818	433
23	513	163	110	110	90	90	526	81	77	194	611	420
24	615	159	105	105	90	88	452	78	70	156	521	379
25	563	155	105	105	90	88	395	74	62	137	533	333
26	470	155	105	105	88	90	344	72	57	124	468	297
27	390	150	100	105	86	95	310	78	53	106	395	251
28	366	145	100	100	86	100	275	89	58	92	310	220
29	350	140	96	100	85	110	247	370	58	104	245	201
30	322	125	96	100	---	120	238	508	59	104	209	183
31	298	---	96	98	---	140	---	505	---	95	184	---
TOTAL	6041	5385	3420	3147	2702	2696	11736	4719	3645	2972	6620	7723
MEAN	195	180	110	102	93.2	87.0	391	152	122	95.9	214	257
MAX	615	333	140	120	100	140	658	508	438	237	818	433
MIN	55	125	96	90	85	78	150	72	53	42	66	168
CFSM	1.14	1.05	.64	.60	.55	.51	2.29	.89	.71	.56	1.25	1.50
IN.	1.31	1.17	.74	.68	.59	.59	2.55	1.03	.79	.65	1.44	1.68

CAL YR 1979 TOTAL 73799 MEAN 202 MAX 1590 MIN 37 CFSM 1.18 IN 16.05
WTR YR 1980 TOTAL 60806 MEAN 166 MAX 818 MIN 42 CFSM .97 IN 13.23

04033000 MIDDLE BRANCH ONTONAGON RIVER NEAR PAULDING, MI

LOCATION.--Lat 46°21'25", long 89°04'38", in SE¼ NE¼ sec.29, T.46 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, Ottawa National Forest, on right bank 25 ft (8 m) downstream from bridge on Forest Service Road 172, 2.4 mi (3.9 km) upstream from Bond Falls Reservoir, and 5.7 mi (9.2 km) southeast of Paulding.

DRAINAGE AREA.--164 mi² (425 km²).

PERIOD OF RECORD.--June 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,485.66 ft (452.829 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 28, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 173 ft³/s (4.899 m³/s), 14.33 in/yr (364 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,050 ft³/s (58.1 m³/s) Apr. 30, 1951, gage height, 10.0 ft (3.05 m), from high-water mark; minimum, 27 ft³/s (0.76 m³/s) Nov. 22, 1946, result of freezeup; minimum gage height, 2.96 ft (0.902 m) Nov. 26, 1942, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 522 ft³/s (14.8 m³/s) Oct. 23, gage height, 5.94 ft (1.811 m); minimum daily, 92 ft³/s (2.61 m³/s) Mar. 7, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	117	400	150	125	120	96	164	209	213	125	123	143
2	128	390	140	125	120	95	172	195	187	118	117	147
3	131	378	145	120	120	94	188	184	170	113	113	157
4	130	350	160	120	120	94	176	181	154	109	110	187
5	128	320	170	115	120	93	192	169	141	112	113	180
6	128	300	170	115	120	93	226	162	140	112	113	157
7	131	275	165	115	120	92	280	159	142	108	111	142
8	130	252	160	120	120	92	363	156	149	105	113	134
9	131	249	155	120	115	93	423	153	145	103	114	251
10	139	237	155	120	115	94	391	149	136	99	112	249
11	142	190	150	120	115	95	336	161	128	101	117	203
12	140	185	150	125	110	95	298	159	123	102	130	186
13	142	180	145	130	110	95	279	151	123	100	125	241
14	143	175	140	135	110	96	258	145	136	125	143	342
15	140	170	140	135	110	98	245	141	135	160	156	321
16	139	170	135	140	110	100	236	137	127	144	139	281
17	135	175	135	145	110	105	235	132	122	127	127	247
18	131	175	140	145	110	105	277	130	129	128	123	219
19	152	185	150	150	110	110	343	127	134	151	127	202
20	169	202	150	145	110	115	405	129	128	176	141	201
21	180	199	145	140	110	115	431	127	122	203	141	351
22	280	196	145	135	110	110	427	125	119	181	132	488
23	514	193	145	135	110	110	415	118	116	159	122	450
24	512	189	145	130	110	110	398	116	110	141	136	374
25	459	182	140	130	105	115	380	114	107	146	210	330
26	390	186	140	125	105	120	361	111	126	145	231	320
27	321	191	135	125	100	120	300	111	139	132	208	303
28	325	187	130	125	100	125	241	119	125	124	182	274
29	328	188	130	125	98	137	229	116	130	150	163	251
30	300	163	130	120	---	142	220	145	131	144	153	232
31	350	---	125	120	---	153	---	221	---	131	144	---
TOTAL	6685	6822	4515	3975	3243	3307	8889	4552	4086	4074	4207	7571
MEAN	216	227	146	128	112	107	296	147	136	131	136	252
MAX	514	400	170	150	120	153	431	221	213	203	231	488
MIN	117	163	125	115	98	92	164	111	107	99	110	134
CFSM	1.32	1.38	.89	.78	.68	.65	1.81	.90	.83	.80	.84	1.54
IN.	1.52	1.55	1.02	.90	.74	.75	2.02	1.03	.93	.92	.97	1.72

CAL YR 1979 TOTAL 77815 MEAN 213 MAX 1310 MIN 86 CFSM 1.30 IN 17.65
WTR YR 1980 TOTAL 62006 MEAN 169 MAX 514 MIN 92 CFSM 1.03 IN 14.06

04033500 BOND FALLS CANAL NEAR PAULDING, MI

LOCATION.--Lat 46°23'57", long 89°08'47", in SW¼ NE¼ sec.11, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 40 ft (12 m) upstream from intake to pipeline No. 2, 0.8 mi (1.3 km) downstream from Bond Falls Reservoir on Middle Branch Ontonagon River, and 1.6 mi (2.6 km) east of Paulding.

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 1,441.59 ft (439.397 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at datum 3.00 ft (0.914 m) higher.

REMARKS.--Records good except those below 10 ft³/s (0.28 m³/s), which are poor. Canal diverts water from Bond Falls Reservoir (station 04034000) to South Branch Ontonagon River; water is used for power production at Victoria Dam near Rockland. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 139 ft³/s (3.936 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 368 ft³/s (10.4 m³/s) May 5, 1960; no flow at times each year since 1961; minimum gage height observed, -0.03 ft (-0.009 m) Apr. 17, 1963, present datum (two drain holes in weir open and canal gate closed).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	239	11	152	279	121	300	3.6	2.3	11	158	233	11
2	239	11	152	277	120	300	2.4	14	11	157	257	82
3	238	11	207	224	120	300	3.7	101	11	157	256	146
4	237	11	288	177	120	300	4.7	102	10	157	195	70
5	236	11	288	177	120	300	4.2	102	10	157	195	12
6	236	12	287	182	120	300	3.7	102	10	156	249	11
7	235	12	284	182	120	295	3.0	102	10	156	248	11
8	236	12	284	240	120	296	2.6	103	10	156	247	109
9	235	12	283	292	120	300	2.3	104	10	155	246	195
10	234	12	283	292	120	300	2.0	104	10	155	245	95
11	234	11	282	294	120	300	1.9	104	10	155	244	14
12	233	93	280	292	120	294	1.8	104	10	154	269	14
13	232	169	291	291	120	297	1.8	104	10	154	311	14
14	231	164	299	258	123	295	1.7	104	11	83	311	14
15	180	164	295	186	197	300	1.7	104	10	13	308	14
16	139	164	301	99	288	300	1.8	104	28	83	306	14
17	139	164	301	61	284	300	1.8	104	55	155	305	14
18	138	164	303	60	287	295	2.0	104	56	161	302	14
19	139	226	305	56	300	304	2.0	104	56	160	216	14
20	140	287	290	53	309	301	2.3	104	56	161	174	14
21	140	189	292	94	309	298	2.3	104	56	160	104	15
22	141	100	291	121	306	296	2.4	104	56	160	12	15
23	92	100	290	121	303	300	2.6	104	55	82	12	15
24	11	158	289	121	300	300	2.3	104	55	14	12	15
25	10	214	287	121	299	295	2.3	104	112	15	11	15
26	10	186	286	121	297	299	2.5	104	160	14	11	15
27	10	79	285	121	300	295	2.4	105	160	14	11	15
28	10	14	283	121	300	292	2.3	105	159	14	11	15
29	10	50	283	121	300	217	2.3	107	159	14	11	16
30	10	152	282	121	---	115	2.3	58	158	86	11	16
31	11	---	281	121	---	71	---	11	---	179	11	---
TOTAL	4625	2963	8604	5276	6063	8755	74.7	2886.3	1535	3595	5334	1034
MEAN	149	98.8	278	170	209	282	2.49	93.1	51.2	116	172	34.5
MAX	239	287	305	294	309	304	4.7	107	160	179	311	195
MIN	10	11	152	53	120	71	1.7	2.3	10	13	11	11

CAL YR 1979 TOTAL 64324.3 MEAN 176 MAX 314 MIN 1.2
WTR YR 1980 TOTAL 50745.0 MEAN 139 MAX 311 MIN 1.7

04034000 BOND FALLS RESERVOIR NEAR PAULDING, MI

LOCATION.--Lat 46°24'29", long 89°07'42", in SW¼ sec.1, T.46 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, at Bond Falls Dam on Middle Branch Ontonagon River, 2.5 mi (4.0 km) east of Paulding.

DRAINAGE AREA.--190 mi² (492 km²).

PERIOD OF RECORD.--June 1942 to current year. Prior to October 1950, monthend contents only published in WSP 1307.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Nonrecording gage read once daily. Datum of gage is 1,335.59 ft (407.088 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Reservoir is formed by earthfill and concrete dam with one taintor gate; dam completed 1937. Usable capacity, 39,720 acre-ft (49.0 hm³) between gage heights of 120 ft (36.6 m) (maximum drawdown) and 141 ft (43.0 m) (full pond). Dead storage unknown. Water diverted to South Branch Ontonagon River through Bond Falls Canal (station 04033500); water used for power production at Victoria Dam near Rockland.

COOPERATION.--Gage-height record furnished by Upper Peninsula Power Co. and converted to acre-feet by Geological Survey.

EXTREMES FOR PERIOD OF RECORD (SINCE 1947).--Maximum contents observed, 42,980 acre-ft (53.0 hm³) July 3, 1953, gage height, 141.7 ft (43.19 m), of which 1,680 acre-ft (2.07 hm³) was uncontrolled storage; minimum, no usable storage at times; minimum gage height observed, 116.0 ft (35.36 m) Mar. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 36,830 acre-ft (45.4 hm³) Nov. 29, gage height, 139.1 ft (42.40 m); minimum, 1,050 acre-ft (1.29 hm³) Mar. 29, 30, gage height, 120.7 ft (36.79 m).

MONTHEND GAGE HEIGHT AND CONTENTS AT 0930, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Date	Gage height (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	133.8	25100	--	--
Oct. 31	135.6	28920	+3820	+62.1
Nov. 30	139.0	36600	+7680	+129
Dec. 31	134.6	26760	-9840	-160
CAL YR 1979	--	--	+10680	+14.8
Jan. 31	132.9	23300	-3460	-56.3
Feb. 29	127.4	12660	-10640	-185
Mar. 31	120.8	1200	-11460	-186
Apr. 30	131.5	20500	+19300	+324
May 31	132.2	21900	+1400	+22.8
June 30	133.1	23700	+1800	+30.2
July 31	132.7	22900	-800	-13.0
Aug. 31	130.6	18740	-4160	-67.7
Sept. 30	137.3	32690	+13950	+234
WTR YR 1980	--	--	+7590	+10.5

04034500 MIDDLE BRANCH ONTONAGON RIVER NEAR TROUT CREEK, MI

LOCATION.--Lat 46°28'40", long 89°05'25", in SW¼ sec.8, T.47 N., R.38 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.1 mi (0.2 km) upstream from State Highway 28, 3.8 mi (6.1 km) west of village of Trout Creek, and 7.5 mi (12.1 km) downstream from Bond Falls Reservoir.

DRAINAGE AREA.--203 mi² (526 km²).

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,132.03 ft (345.043 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 4, 1942, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Jan. 15 to Mar. 18, which are fair. Flow regulated by Bond Falls Reservoir (station 04034000) 7.5 mi (12.1 km) upstream. Diversion to South Branch Ontonagon River 8.5 mi (13.7 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 67.8 ft³/s (1.920 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Nov. 7, 1951, gage height, 5.05 ft (1.539 m); minimum, 14 ft³/s (0.40 m³/s) sometime during period Jan. 23 to Feb. 13, 1947, gage height, 1.14 ft (0.347 m), from recorded range in stage, caused by ice jams upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 259 ft³/s (7.33 m³/s) July 14, gage height, 2.54 ft (0.774 m); minimum daily, 41 ft³/s (1.16 m³/s) Dec. 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45	47	42	46	45	45	52	46	60	53	55	53
2	45	47	41	44	45	45	54	46	58	52	56	45
3	44	46	46	43	45	45	54	46	56	52	55	49
4	44	46	46	44	45	45	56	46	54	51	56	47
5	45	46	50	45	45	45	60	46	52	54	55	45
6	45	46	46	45	45	45	71	46	52	52	55	45
7	45	46	45	44	45	45	87	46	52	52	55	45
8	44	46	43	45	45	45	86	46	52	53	55	46
9	46	46	45	45	45	45	68	46	52	53	54	68
10	46	45	46	45	45	45	58	47	52	54	54	49
11	45	43	45	45	45	45	52	48	52	54	57	47
12	46	45	43	45	45	45	51	48	52	62	55	57
13	46	42	46	45	45	45	50	48	52	56	55	80
14	45	45	43	45	45	45	49	48	54	133	60	67
15	45	45	46	45	45	45	50	48	53	65	57	54
16	45	45	45	45	45	45	50	48	53	64	55	51
17	43	45	45	45	45	45	57	48	52	58	55	50
18	43	45	45	45	45	46	68	48	53	68	55	51
19	48	45	46	45	45	46	67	48	52	66	58	50
20	55	46	46	45	45	46	60	48	52	75	58	53
21	70	46	46	45	45	45	56	48	53	63	59	99
22	52	46	46	45	45	45	53	48	53	58	57	62
23	48	46	45	45	45	44	50	48	52	56	56	53
24	47	46	45	45	45	44	50	48	52	55	60	53
25	45	42	45	45	45	45	48	48	53	67	59	57
26	45	50	44	45	45	46	48	48	57	59	59	58
27	45	50	42	45	45	46	48	49	53	56	57	53
28	45	46	42	45	45	47	46	50	53	57	57	50
29	45	46	43	45	45	48	46	52	53	57	57	50
30	48	45	43	45	---	49	46	65	53	56	57	48
31	55	---	46	45	---	51	---	62	---	56	56	---
TOTAL	1455	1370	1387	1391	1305	1413	1691	1507	1597	1867	1749	1635
MEAN	46.9	45.7	44.7	44.9	45.0	45.6	56.4	48.6	53.2	60.2	56.4	54.5
MAX	70	50	50	46	45	51	87	65	60	133	60	99
MIN	43	42	41	43	45	44	46	46	52	51	54	45

CAL YR 1979 TOTAL 21182 MEAN 58.0 MAX 742 MIN 41
WTR YR 1980 TOTAL 18367 MEAN 50.2 MAX 133 MIN 41

04035500 MIDDLE BRANCH ONTONAGON RIVER NEAR ROCKLAND, MI

LOCATION.--Lat 46°41'57", long 89°09'36", in SE¼ sec.27, T.50 N., R.39 W., Ontonagon County, Hydrologic Unit 04020102, on left bank 10 ft (3 m) upstream from bridge on U.S. Highway 45, 700 ft (213 m) downstream from East Branch, and 2.8 mi (4.5 km) southeast of Rockland.

DRAINAGE AREA.--671 mi² (1,738 km²).

PERIOD OF RECORD.--July 1942 to current year.

GAGE.--Water-stage recorder. Datum of gage is 661.1 ft (201.50 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1959 nonrecording gage at site 400 ft (122 m) upstream at same datum. Apr. 1, 1959 to Oct. 21, 1968, nonrecording gage at present site and datum.

REMARKS.--Records fair. No gage-height record Jan. 7 to Feb. 14. Regulation by Bond Falls Reservoir (station 04034000) 30.0 mi (48.3 km) upstream. Diversion to South Branch Ontonagon River 31.0 mi (49.9 km) upstream by Bond Falls Canal (station 04033500). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 527 ft³/s (14.92 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 27,000 ft³/s (765 m³/s) Aug. 22, 1942, gage height, 21.2 ft (6.46 m), from floodmarks, from rating curve extended above 7,500 ft³/s (212 m³/s) on basis of slope-area measurement of peak flow; minimum observed, 142 ft³/s (4.02 m³/s) Dec. 3, 1963, discharge measurement; minimum daily, 145 ft³/s (4.11 m³/s) Dec. 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 14, gage height, 10.45 ft (3.185 m); minimum daily, 188 ft³/s (5.32 m³/s) May 27, 28, July 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	230	2150	380	295	275	270	900	442	943	235	250	293
2	240	1080	360	290	275	265	1200	404	882	224	241	325
3	240	710	350	285	275	260	1600	362	693	212	235	423
4	256	590	350	285	275	260	1550	334	483	203	229	645
5	248	490	350	280	280	260	2000	321	342	201	229	391
6	248	450	350	275	280	255	2940	301	303	208	229	288
7	234	430	340	275	280	255	4450	299	289	208	226	247
8	234	400	340	275	280	255	3640	299	285	202	223	232
9	248	356	330	280	280	260	2030	299	285	195	223	451
10	248	380	320	285	275	260	1330	299	270	190	220	535
11	280	390	310	290	275	265	1090	336	248	188	270	358
12	312	390	300	290	275	265	984	346	244	454	295	294
13	383	383	300	300	270	270	912	309	240	490	285	1940
14	347	400	290	310	270	275	796	288	491	4300	281	3070
15	356	410	290	315	270	280	797	271	848	2770	294	1110
16	365	420	300	320	270	285	900	260	521	1010	283	766
17	312	430	300	325	270	300	1550	248	361	932	254	584
18	280	440	310	330	270	310	2300	243	296	758	244	592
19	288	520	330	330	275	310	2220	233	258	935	342	602
20	347	650	330	335	275	310	1720	227	239	1240	846	772
21	490	480	340	335	280	310	1320	222	231	1180	3930	2860
22	1710	470	340	330	285	310	1130	215	229	777	872	1900
23	3200	450	345	325	290	315	947	214	227	535	577	1040
24	1620	450	340	320	290	315	810	204	207	393	490	881
25	1120	440	335	310	285	320	803	197	199	340	692	1240
26	820	440	325	305	280	340	780	189	227	482	637	1710
27	820	430	320	300	280	370	718	188	292	416	481	987
28	1170	420	315	295	275	390	615	188	269	335	384	741
29	1010	410	310	290	275	430	539	238	247	317	331	561
30	770	390	305	285	---	470	498	538	242	296	309	468
31	860	---	300	280	---	620	---	884	---	279	295	---
TOTAL	19286	15849	10105	9345	8035	9660	43061	9398	10891	20503	14705	26306
MEAN	622	528	326	301	277	312	1435	303	363	661	474	877
MAX	3200	2150	380	335	290	620	4450	884	943	4300	3930	3070
MIN	230	356	290	275	270	255	498	188	199	188	220	232

CAL YR 1979 TOTAL 236163 MEAN 647 MAX 6160 MIN 192
WTR YR 1980 TOTAL 197144 MEAN 539 MAX 4450 MIN 188

04036000 WEST BRANCH ONTONAGON RIVER NEAR BERGLAND, MI

LOCATION.--Lat 46°35'15", long 89°32'30", in SE¼ NE¼ sec.3, T.48 N., R.42 W., Ontonagon County, Hydrologic Unit 04020102, on right bank 0.4 mi (0.6 km) downstream from dam at outlet of Gogebic Lake, and 1.5 mi (2.4 km) east of Bergland.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--July 1942 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,290.81 ft (393.439 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 5, 1942, nonrecording gage 0.4 mi (0.6 km) upstream at different datum.

REMARKS.--Records good except those below 25 ft³/s (0.71 m³/s), which are poor. Flow regulated by Gogebic Lake, usable capacity, 35,200 acre-ft (43.4 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 175 ft³/s (4.956 m³/s), 14.67 in/yr (373 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,400 ft³/s (39.6 m³/s) Apr. 26, 1960, gage height, 5.98 ft (1.823 m); minimum daily, 0.70 ft³/s (0.020 m³/s) Sept. 26 to Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 604 ft³/s (17.1 m³/s) Nov. 2, gage height, 4.11 ft (1.253 m); minimum daily, 4.0 ft³/s (0.11 m³/s) May 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	92	544	246	108	275	143	115	12	21	48	165	336
2	91	558	262	195	284	143	118	10	23	14	151	361
3	96	565	437	106	276	142	122	9.0	84	8.4	77	374
4	89	534	329	139	267	139	130	8.4	144	8.4	45	411
5	94	407	214	203	258	136	138	7.2	238	9.2	150	296
6	82	262	206	195	253	134	156	6.8	222	9.2	196	264
7	84	316	198	208	247	132	192	6.0	202	9.2	183	253
8	81	322	199	210	240	130	219	5.6	204	9.2	184	317
9	81	245	303	217	235	129	253	5.6	195	9.2	117	298
10	86	320	360	250	230	127	280	5.2	196	8.4	82	267
11	84	439	338	260	225	126	294	5.2	194	10	75	247
12	76	516	317	262	222	126	305	5.0	196	8.4	77	290
13	79	453	352	246	216	125	314	5.0	181	8.4	77	340
14	86	392	411	241	194	125	314	4.8	173	10	78	378
15	83	166	341	178	184	122	320	4.8	166	10	78	461
16	82	128	246	107	185	120	323	5.0	158	71	77	496
17	77	214	298	157	181	118	330	5.4	180	38	78	459
18	80	208	351	226	176	117	347	5.6	159	28	74	463
19	82	307	334	248	175	117	390	5.8	159	54	69	488
20	88	198	304	239	174	116	442	6.0	162	63	47	474
21	95	46	214	261	169	116	485	4.4	155	135	256	485
22	98	6.0	158	283	168	114	515	4.4	147	170	455	512
23	56	84	150	286	162	112	515	4.0	146	211	477	508
24	5.6	262	146	273	159	111	281	4.8	144	227	521	538
25	6.0	225	143	269	156	111	77	5.8	141	202	519	510
26	6.0	104	138	262	154	110	25	6.0	126	200	499	517
27	6.0	30	133	256	156	111	23	6.0	123	196	484	495
28	168	8.4	127	273	148	110	18	6.0	124	188	472	483
29	276	145	122	276	148	111	16	6.0	116	173	463	474
30	345	239	117	271	---	111	14	8.4	75	169	440	443
31	460	---	113	253	---	112	---	6.8	---	167	328	---
TOTAL	3202.6	8243.4	7577	6894	5923	3796	7052	191.6	4538	2472.0	6974	12238
MEAN	103	275	244	223	204	122	235	6.18	151	79.7	225	408
MAX	460	565	437	286	284	143	516	12	238	227	521	538
MIN	5.6	6.0	113	105	148	110	14	4.0	21	8.4	45	247

CAL YR 1979 TOTAL 72104.1 MEAN 198 MAX 896 MIN 5.6 CFSM 1.22 IN 16.56
WTR YR 1980 TOTAL 69115.6 MEAN 189 MAX 565 MIN 4.0 CFSM 1.17 IN 15.87

04037500 CISCO BRANCH ONTONAGON RIVER AT CISCO LAKE OUTLET, MI

LOCATION.--Lat 46°15'12", long 89°27'05", in NE¼ sec.32, T.45 N., R.41 W., Gogebic County, Hydrologic Unit 04020102, on left bank 80 ft (24 m) downstream from Cisco Lake Dam, 2.5 mi (4.0 km) upstream from Langford Creek, 5.0 mi (8.0 km) upstream from U.S. Highway 2, and 13 mi (21 km) west of Watersmeet.

DRAINAGE AREA.--50.7 mi² (131.3 km²).

PERIOD OF RECORD.--October 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,672.69 ft (509.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, nonrecording gage at same site and at datum 4.00 ft (1.219 m) higher.

REMARKS.--Records good except those below 1.0 ft³/s (0.028 m³/s), which are fair. Flow completely regulated by Cisco Lake, usable capacity, 15,600 acre-ft (19.2 hm³). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 46.8 ft³/s (1.325 m³/s), 12.54 in/yr (319 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 288 ft³/s (8.16 m³/s) May 1-4, 1951, gage height, 6.10 ft (1.859 m), present datum; minimum daily, 0.09 ft³/s (0.003 m³/s) June 4-23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 171 ft³/s (4.84 m³/s) Sept. 22, gage height, 5.62 ft (1.713 m); minimum daily, 0.15 ft³/s (0.004 m³/s) June 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.73	122	85	37	38	42	51	3.1	.28	.23	42	29
2	17	118	84	38	37	41	42	2.7	.28	.23	25	28
3	60	115	60	38	37	40	42	2.5	.28	.22	13	59
4	87	114	30	38	38	39	42	2.3	.28	.22	14	76
5	106	111	31	37	37	39	42	2.2	.28	.25	14	60
6	120	108	31	39	37	39	44	2.1	.28	.40	7.2	20
7	124	108	33	41	37	39	54	1.9	.28	.28	2.1	3.3
8	119	104	34	53	30	39	70	1.7	.28	.28	2.2	3.2
9	133	104	35	66	24	39	78	1.5	.28	.28	2.3	3.0
10	141	102	50	65	25	39	78	.97	.28	.25	2.3	3.0
11	136	100	63	66	25	39	78	.81	.28	.25	18	3.2
12	114	97	62	65	25	39	78	.70	.25	.25	47	19
13	117	95	62	65	26	39	78	.58	.25	.25	59	80
14	127	94	60	64	26	39	78	.58	.25	.28	59	115
15	122	92	60	64	26	39	77	.58	.25	.28	57	114
16	118	91	59	65	27	39	77	.53	.25	.31	56	89
17	113	89	59	67	27	39	76	.45	.25	.34	56	75
18	111	88	46	67	27	39	76	.48	.22	.31	26	57
19	110	88	37	66	28	35	76	.47	.20	.31	2.3	44
20	109	89	37	66	33	32	77	.37	.20	.37	2.3	28
21	106	89	38	65	44	32	77	.32	.20	.40	2.2	21
22	114	90	37	65	44	31	66	.29	.20	.55	2.1	104
23	123	90	37	65	43	32	33	.29	.15	.55	2.2	166
24	129	90	38	64	43	31	23	.29	.15	1.0	3.1	164
25	128	88	38	57	43	31	23	.29	.16	25	56	130
26	127	88	38	42	42	31	16	.29	.24	43	96	110
27	125	88	38	37	42	32	5.1	.28	.26	42	94	107
28	120	87	38	38	42	54	4.4	.28	.22	41	91	105
29	120	86	38	38	42	61	3.9	.28	.16	44	60	71
30	118	86	38	38	---	55	3.5	.28	.23	44	28	27
31	121	---	37	38	---	54	---	.28	---	43	28	---
TOTAL	3415.73	2911	1433	1654	995	1219	1568.9	29.69	7.17	290.09	969.3	1913.7
MEAN	110	97.0	46.2	53.4	34.3	39.3	52.3	.96	.24	9.36	31.3	63.8
MAX	141	122	85	67	44	61	78	3.1	.28	44	96	166
MIN	.73	86	30	37	24	31	3.5	.28	.15	.22	2.1	3.0

CAL YR 1979 TOTAL 20421.49 MEAN 57.3 MAX 185 MIN .58 CFSM 1.13 IN 15.35
WTR YR 1980 TOTAL 16406.58 MEAN 44.8 MAX 166 MIN .15 CFSM .88 IN 12.04

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°43'15", long 89°12'25", in NE¼ sec.20, T.50 N., R.39 W., Ontonagon County, Hyrologic Unit 04020102, on left bank 50 ft (15 m) downstream from bridge on Victoria Road, 1.8 mi (2.9 km) southwest of Rockland, and 2.4 mi (3.9 km) downstream from confluence of Middle and West Branches.

DRAINAGE AREA.--1,340 mi² (3,470 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1942 to current year.

REVISED RECORDS.--WSP 1387: 1943, 1946-47. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 638.72 ft (194.682 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 23, 1943, nonrecording gage and Nov. 23, 1943 to Oct. 17, 1967, water-stage recorder at site 50 ft (15 m) upstream at same datum.

REMARKS.--Water-discharge records fair. Plugged or partially plugged intakes Oct. 1 to Apr. 21. Considerable regulation by powerplant on West Branch 5 mi (8 km) upstream; Bond Falls Reservoir (station 04034000) 25 mi (40 km) upstream; Gogebic and Cisco Lakes, combined usable capacity, 50,800 acre-ft (62.6 hm³), in headwaters.

AVERAGE DISCHARGE.--38 years, 1,407 ft³/s (39.85 m³/s), 14.26 in/yr (362 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 42,000 ft³/s (1,190 m³/s) Aug. 22, 1942, gage height, 28.6 ft (8.73 m) from floodmark, from rating curve extended above 14,000 ft³/s (396 m³/s) on basis of slope-area measurement of peak flow; minimum daily, 192 ft³/s (5.44 m³/s) July 28, 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 9,000 ft³/s (255 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 7	--	Unknown		Unknown		Aug. 21	1100	*10,600	300	*13.29	4.051
July 14	1800	9,280	263	12.62	3.847						

Minimum daily discharge, 365 ft³/s (10.3 m³/s) May 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	740	4180	1270	940	920	1150	2100	956	1780	626	530	890
2	750	3440	1250	930	880	1050	3400	935	1720	530	650	935
3	750	2880	1150	910	820	1000	3300	920	1160	536	650	1090
4	760	2340	1240	900	940	980	3800	880	1090	536	704	1680
5	840	1860	1340	880	980	960	5000	840	905	435	644	1610
6	800	1660	1340	870	1000	940	7000	740	957	554	674	1200
7	840	1390	1320	870	1050	940	9000	730	674	480	789	994
8	880	1610	1290	860	1050	940	7000	720	747	578	768	680
9	920	1320	1270	800	1100	940	6000	710	729	415	662	1210
10	970	1300	1260	780	1100	940	3700	720	656	572	668	2440
11	1000	1160	1290	1300	1100	940	4000	740	566	460	620	1820
12	1100	1230	1260	1200	1100	940	3300	750	656	548	698	1210
13	1200	1260	1250	1150	1200	940	3500	660	455	803	817	3010
14	1150	1280	1250	1150	950	940	2200	700	878	4000	698	6360
15	1100	1280	1250	1300	960	940	2300	670	1210	4290	845	3680
16	1000	1310	1250	1200	970	960	2500	660	910	1740	831	2720
17	920	1280	1250	1000	970	960	5000	650	656	1070	874	2030
18	920	1250	1250	800	970	980	7600	640	638	1220	865	1700
19	920	1240	1250	900	970	1000	6800	630	686	1400	1010	1700
20	1000	1420	1250	1000	970	1000	6000	580	475	1840	1210	2040
21	1190	1800	1250	1050	980	1000	4800	542	632	2010	7590	4720
22	2280	1380	1200	1100	1100	1000	3980	445	554	1570	4970	5050
23	7130	1360	1200	1100	1050	1000	2710	415	480	1370	3270	3250
24	5280	1360	1200	1100	1000	1050	2210	440	614	1150	1880	2790
25	3950	1320	1150	1100	1000	1050	1910	410	480	740	1450	2850
26	2750	1390	1100	1100	1080	1100	1700	365	548	913	2020	3680
27	1990	2220	1000	1100	1050	1100	1570	375	674	824	1730	2800
28	2700	1900	1000	1050	1100	1200	1340	470	810	1030	1580	1950
29	3010	1460	970	1050	1200	1300	1300	626	650	1160	1320	1660
30	2420	1350	960	1050	---	1500	1030	1050	560	921	1190	1600
31	2220	---	950	1000	---	2300	---	1640	---	572	1110	---
TOTAL	53480	50310	37260	31540	29680	33040	116050	21609	23549	34893	43237	69349
MEAN	1725	1677	1202	1017	1017	1066	3868	697	785	1126	1395	2312
MAX	7130	4180	1340	1300	1200	2300	9000	1640	1780	4290	7590	6360
MIN	740	1160	950	780	820	940	1030	365	455	415	530	680

CAL YR 1979 TOTAL 612329 MEAN 1678 MAX 14800 MIN 240 CFSM 1.25 IN 17.00
WTR YR 1980 TOTAL 543797 MEAN 1486 MAX 9000 MIN 365 CFSM 1.11 IN 15.10

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1972 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor October 1975 to September 1977.

REMARKS.--Daily record is from once-daily observer samples. In addition, monthly samples collected as a cross-section sample at upstream side of bridge on Victoria Road. Complete ice cover during winter period. Biological Data (Phytoplankton) is for 1979 and 1980 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 192 micromhos Mar. 26, 1977, May 28, 1978; minimum (water years 1975-76, 1979-80), 45 micromhos Dec. 2, 1975.
WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 178 micromhos Aug. 5; minimum daily, 73 micromhos Apr. 9.
WATER TEMPERATURES: Maximum daily, 25.0°C July 9-11, Aug. 6; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT												
02...	1430	934	125	--	14.0	10.1	100	10	K9	61	10	17
NOV												
06...	1300	1660	92	7.2	3.0	12.8	96	K24	62	40	5	11
DEC												
03...	1400	1320	104	7.3	.0	13.7	95	29	28	48	5	13
JAN												
16...	1500	E1150	126	7.6	.0	13.9	98	K5	K7	62	8	17
FEB												
04...	1600	1180	118	7.6	.0	12.8	88	K3	K4	54	0	15
MAR												
03...	1600	1000	136	7.7	.0	13.2	93	<1	K5	61	0	17
APR												
22...	1130	2590	74	7.7	10.0	10.6	97	K15	K17	36	5	11
MAY												
20...	1600	535	134	8.2	18.0	10.4	112	K2	K7	61	0	16
JUN												
26...	1030	250	168	8.0	22.5	8.1	96	61	164	69	0	19
JUL												
21...	1500	1910	114	7.7	22.0	8.0	93	500	K625	57	0	17
AUG												
19...	1430	1050	138	8.1	21.0	9.2	106	K14	23	65	1	18
SEP												
23...	1445	3480	76	7.3	11.0	10.9	100	220	640	36	7	11

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	SODIUM PERCENT	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT											
02...	4.4	0	2.1	.1	7	.9	--	--	51	--	3.5
NOV											
06...	3.1	0	2.0	.1	13	1.6	43	0	35	4.3	6.6
DEC											
03...	3.8	--	2.5	.2	14	1.0	52	0	43	4.2	6.0
JAN											
16...	4.7	0	2.7	.2	12	.9	66	0	54	2.7	4.5
FEB											
04...	3.9	0	2.2	.1	11	1.0	68	0	56	2.7	5.3
MAR											
03...	4.6	--	2.2	.1	7	.8	76	0	62	2.4	5.1
APR											
22...	2.1	0	1.2	.1	7	1.0	38	0	31	1.2	4.2
MAY											
20...	5.2	0	3.2	.2	10	.8	86	0	71	.8	4.3
JUN											
26...	5.3	--	2.8	.1	8	1.1	100	0	82	1.4	5.9
JUL											
21...	3.6	0	2.3	.1	8	1.0	70	0	59	2.3	1.9
AUG											
19...	4.9	0	2.5	.1	8	.9	78	0	64	1.0	3.4
SEP											
23...	2.0	--	1.7	.1	9	1.0	42	0	29	2.8	3.7

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
02...	1.9	.1	8.3	86	69	217	.01	--	.050	--	.06
NOV											
06...	2.2	.1	7.9	74	56	332	.04	.04	.020	.020	.02
DEC											
03...	2.2	.1	9.5	94	64	299	.07	.07	--	.030	.02
JAN											
15...	2.4	.1	11	84	77	E261	.22	.21	.010	.010	.01
FEB											
04...	2.1	.1	9.1	85	73	271	.10	.10	.040	.020	.05
MAR											
03...	2.0	.1	11	91	81	246	.12	.11	.040	.000	.05
APR											
22...	1.3	.0	6.4	74	47	517	.08	.08	.030	.020	.04
MAY											
20...	2.2	.1	7.9	84	76	121	.00	.00	.040	.000	.05
JUN											
26...	2.2	.1	7.0	104	88	70.2	.03	.02	.050	.000	.06
JUL											
21...	2.6	.1	8.4	107	73	552	--	.08	.070	.000	.08
AUG											
18...	1.8	.1	9.2	82	79	232	.01	.01	.040	.010	.05
SEP											
23...	1.7	.1	8.6	106	48	996	--	.06	.030	.000	.04

DATE	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
02...	.25	.30	.31	1.4	.020	.06	.020	--	10	25	100
NOV											
06...	.49	.51	.55	2.4	.040	.12	.010	12	23	103	100
DEC											
03...	.72	.74	.81	3.6	.050	.15	.010	8.8	20	71	100
JAN											
15...	.40	.41	.63	2.8	.040	.12	.010	--	--	--	--
FEB											
04...	.29	.33	.43	1.9	.030	.09	.020	12	--	--	--
MAR											
03...	.22	.26	.38	1.7	.030	.09	.010	7.2	--	--	--
APR											
22...	.49	.52	.60	2.7	.150	.46	.020	--	135	944	100
MAY											
20...	.29	.33	.33	1.5	.040	.12	.020	4.8	18	26	100
JUN											
26...	.20	.25	.28	1.2	.030	.09	.010	4.9	21	14	100
JUL											
21...	.67	.74	.81	3.6	.180	.55	.040	--	245	1260	100
AUG											
18...	.33	.37	.38	1.7	.040	.12	.010	6.3	25	71	100
SEP											
23...	.64	.67	.71	3.1	.100	.31	.030	16	117	1100	74

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT										
02...	1430	2	2	--	30	0	0	10	10	0
JAN										
16...	1500	0	0	<50	30	--	3	--	10	18
APR										
22...	1130	2	2	<50	30	0	0	20	10	0
JUL										
21...	1500	2	2	<50	30	2	2	50	10	8

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT										
02...	0	3	2	400	110	2	0	30	8	<.5
JAN										
16...	4	9	2	5500	180	4	0	80	7	.3
APR										
22...	0	10	6	2000	190	6	0	70	10	.1
JUL										
21...	0	14	5	4300	170	7	0	150	10	.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT										
02...	<.5	1	0	0	0	0	--	3	7.8	.3
JAN										
16...	<.1	450	0	0	0	0	60	60	7.6	.4
APR										
22...	.1	6	1	0	0	0	--	30	9.3	1.0
JUL										
21...	<.1	15	0	0	0	0	20	9	16	1.6

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV							
06...	1300	35	--	.000	.000	.000	.000
FEB							
04...	1600	19	--	.000	.000	.000	.000
MAY							
20...	1600	28	703	11.1	12.0	1.28	.220

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	DEC 5,78		MAR 19,79		APR 24,79		MAY 16,79		JUN 12,79		JUN 26,79	
TIME	1400		1430		1345		1500		1515		1100	
TOTAL CELLS/ML	43		320		280		540		1600		210	
DIVERSITY: DIVISION	0.0		1.1		1.0		1.6		0.3		1.5	
.CLASS	0.0		1.1		1.0		1.6		0.3		1.5	
..ORDER	0.0		1.1		1.3		1.9		0.3		2.1	
...FAMILY	0.9		2.5		2.6		2.5		0.3		2.5	
....GENUS	0.9		2.5		3.2		2.5		0.3		2.6	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	--	-	--	-	56	10	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-	13	6
....CHLORELLA	--	-	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	56	10	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-	13	6
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-	52#	25
..TETRASPORALES												
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	14	5	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	40	13	28	10	42	8	--	-	26	13
...VOLVOCACEAE												
....GONIUM	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....COSMARIUM	--	-	--	-	14	5	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	--	-	--	-	14	3	--	-	39#	19
....MELOSIRA	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	14	5	--	-	--	-	--	-
....COCCONEIS	--	-	40	13	--	-	14	3	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....CYMBELLA	--	-	--	-	14	5	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	14#	33	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE												
....EUNOTIA	--	-	--	-	14	5	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	81#	25	70#	25	--	-	--	-	--	-
....SYNEDRA	29#	67	--	-	42	15	14	3	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	14	3	--	-	--	-
...MERIDIONACEAE												
....MERIDION	--	-	--	-	--	-	28	5	--	-	--	-
...NAVICULACEAE												
....NAVICULA	--	-	81#	25	--	-	14	3	--	-	--	-
...NITZSCHIACEAE												
....HANTZSCHIA	--	-	--	-	14	5	--	-	--	-	--	-
....NITZSCHIA	--	-	40	13	42	15	--	-	78	5	13	6
.XANTHOPHYCEAE												
..HETEROCOCCALES												
...CHLOROTHECIACEAE												
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	DEC 5,78 1400		MAR 19,79 1430		APR 24,79 1345		MAY 16,79 1500		JUN 12,79 1515		JUN 26,79 1100	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-	52#	25
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	--	-	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	280#	51	1600#	95	--	-
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....TRACHELOMONAS	--	-	--	-	--	-	14	3	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...PERIDINIACEAE												
....PERIDINIUM	--	-	40	13	14	5	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 17,79	AUG 14,79	SEP 12,79	NOV 6,79	MAR 3,80
TIME	1500	1415	1330	1300	1600
TOTAL CELLS/ML	3500	1100	1800	850	96
DIVERSITY: DIVISION	1.3	1.1	1.2	0.5	0.0
.CLASS	1.3	1.1	1.2	0.5	0.0
..ORDER	1.3	1.1	1.3	0.5	0.3
...FAMILY	1.6	1.3	2.9	0.6	2.4
....GENUS	2.4	1.4	3.1	0.6	2.4

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	13	2	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	150	14	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	330	10	26	2	36	2	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	720#	21	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	97	3	--	-	--	-	--	-	--	-
....OOCYSTIS	28	1	51	5	--	-	--	-	--	-
....SELENASTRUM	42	1	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	190	6	--	-	18	1	52	6	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	*	0	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	18	1	--	-	5	5
....MELOSIRA	--	-	64	6	27	1	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	*	0	--	-	--	-
....COCCONEIS	42	1	--	-	120	6	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	*	0	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	*	0	--	-	82	4	--	-	15#	16
....EPITHEMIA	--	-	--	-	18	1	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	27	1	--	-	20#	21
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	36	2	--	-	--	-
....FRAGILARIA	--	-	--	-	36	2	--	-	--	-
....SYNEDRA	--	-	--	-	55	3	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	--	-	73	4	--	-	20#	21
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	*	0	--	-	240	13	--	-	10	11
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	28	1	13	1	140	7	13	2	25#	26
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 17,79		AUG 14,79		SEP 12,79		NOV 6,79		MAR 3,80	
TIME	1500		1415		1330		1300		1600	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	190	6	820#	73	--	-	--	-	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
....GOMPHOSPHAERIA	1700#	48	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	690#	38	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	190	10	770#	91	--	-
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	28	1	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	*	0	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 20,80 1600	JUN 26,80 1030	JUL 21,80 1500	AUG 18,80 1430	SEP 23,80 1445
TOTAL CELLS/ML	310	450	960	1500	3800
DIVERSITY: DIVISION	1.3	0.7	1.5	1.3	0.6
.CLASS	1.3	0.7	1.6	1.3	0.6
..ORDER	1.4	0.8	1.9	1.6	1.4
...FAMILY	1.5	0.9	2.2	2.5	1.7
....GENUS	1.5	0.9	2.8	2.5	1.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	13	3	55	6	--	-	--	-
....CHLORELLA	--	-	13	3	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	26	2	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	*	0
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	220#	23	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	26	2	27	1
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	52#	17	13	3	14	1	39	3	27	1
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	130	9	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13	4	--	-	14	1	26	2	--	-
....MELOSIRA	--	-	--	-	28	3	--	-	82	2
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	13	3	14	1	--	-	27	1
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	13	3	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	26	2	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	150	4
....FRAGILARIA	--	-	--	-	--	-	210	14	41	1
....SYNEDRA	13	4	--	-	--	-	--	-	*	0
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	14	1	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	14	1	--	-	*	0
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	26	8	--	-	--	-	13	1	*	0
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	28	3	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	14	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

STREAMS TRIBUTARY TO LAKE SUPERIOR

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 20,80 1600		JUN 26,80 1030		JUL 21,80 1500		AUG 18,80 1430		SEP 23,80 1445	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	210#	67	--	-	--	-	26	2	--	-
....COCCOCHLORIS	--	-	--	-	28	3	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	2400#	63
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	210	5
....APHANIZOMENON	--	-	--	-	--	-	450#	31	690#	18
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	140	4
....OSCILLATORIA	--	-	390#	86	260#	27	490#	34	--	-
....PHORMIDIUM	--	-	--	-	250#	26	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	14	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04040000 ONTONAGON RIVER NEAR ROCKLAND, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	126	110	116	---	122	132	114	114	138	142	141	116
2	129	88	108	93	122	133	114	120	136	142	---	116
3	132	100	110	130	109	136	101	120	129	144	132	141
4	124	90	104	114	113	136	95	123	124	169	132	137
5	129	94	109	126	120	---	100	126	122	---	178	124
6	127	94	114	128	114	136	94	133	118	---	142	---
7	124	93	112	120	122	138	120	140	131	144	138	---
8	123	90	136	129	122	138	91	136	125	148	140	116
9	126	101	110	129	122	142	73	137	125	156	139	110
10	128	95	118	130	124	138	74	---	130	151	144	110
11	129	106	114	129	123	138	86	---	129	152	142	110
12	131	102	112	131	123	138	87	142	123	---	144	103
13	126	128	112	---	123	140	88	137	121	---	146	---
14	136	104	142	---	135	86	92	138	135	---	146	---
15	124	107	116	---	132	88	100	137	---	173	140	98
16	126	102	112	126	124	141	98	142	134	148	---	94
17	123	113	110	---	124	146	132	138	133	162	---	94
18	129	137	114	---	124	148	104	142	133	140	142	110
19	---	112	122	---	125	154	80	144	136	---	151	96
20	144	118	113	140	125	148	80	148	135	---	148	---
21	128	106	116	118	128	146	88	152	128	147	126	166
22	132	106	115	114	136	136	94	152	130	128	84	101
23	134	104	118	118	124	139	74	153	138	130	---	86
24	93	107	119	114	124	140	92	170	145	130	---	92
25	88	106	116	114	122	152	92	168	142	139	109	108
26	90	112	128	114	123	148	94	156	---	---	103	106
27	93	108	123	114	130	141	96	155	152	---	106	93
28	119	96	128	113	131	152	97	148	---	---	128	---
29	104	103	152	116	132	144	100	156	---	128	104	97
30	88	102	128	90	---	142	103	166	144	134	106	96
31	86	---	124	114	---	142	---	158	---	142	108	---
MEAN		104	118		124		95					

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14.5	7.0	.5	.0	.0	.0	2.0	14.5	18.0	22.0	24.0	20.0
2	15.0	6.0	.5	.0	.0	.0	2.5	14.5	18.5	22.0	---	20.0
3	14.0	5.0	.5	.0	.0	.0	2.0	14.5	19.0	23.5	24.5	18.5
4	14.0	5.0	.5	.0	.0	.0	2.0	15.0	20.0	22.0	23.0	19.5
5	13.0	4.0	1.0	.0	.0	.0	2.5	16.5	20.0	---	19.0	19.5
6	12.5	4.0	.5	.0	.0	.0	1.5	12.5	20.5	---	25.0	---
7	12.0	4.0	.5	.0	.0	.0	2.0	12.0	17.0	24.0	24.0	---
8	11.0	3.0	1.0	.0	.0	.0	2.0	11.0	17.5	24.0	23.5	21.0
9	11.0	2.5	1.0	.0	.0	.0	2.0	12.0	18.0	25.0	23.0	20.0
10	11.0	2.0	1.0	.0	.0	.0	1.0	---	17.5	25.0	23.0	19.5
11	10.0	2.5	.5	.0	.0	.0	2.0	---	19.0	25.0	23.0	19.0
12	8.5	2.0	.5	.0	.0	.0	2.0	14.0	19.5	---	23.0	17.0
13	8.0	1.0	.0	.0	.0	.0	2.0	13.5	19.5	---	22.0	---
14	7.0	2.0	.5	.0	.0	.5	2.5	13.0	16.0	21.5	22.0	---
15	10.0	1.5	.5	.0	.0	.0	4.0	15.0	---	23.5	22.0	15.0
16	9.0	1.0	.0	.0	.0	.0	4.0	16.0	17.0	23.5	---	15.0
17	9.0	2.0	.0	.0	.0	.0	6.0	15.5	16.0	23.5	---	14.0
18	8.5	2.0	.0	.0	.0	.5	4.0	17.0	17.0	22.5	21.5	13.5
19	---	2.5	.5	.0	.0	1.5	5.0	18.0	17.0	---	21.0	13.5
20	11.0	2.0	1.0	.0	.0	1.0	7.0	18.5	18.0	---	22.0	---
21	10.0	3.0	1.0	.0	.0	.0	10.0	19.5	20.5	23.0	20.5	12.0
22	8.0	2.0	1.0	.0	.0	.0	13.0	20.5	21.0	23.0	22.0	13.0
23	7.0	3.0	.5	.0	.0	.0	9.0	21.0	21.0	23.0	---	12.5
24	5.0	3.0	.5	.0	.0	.0	7.5	21.0	24.0	23.5	---	12.0
25	5.0	3.0	.5	.0	.0	.0	7.5	18.5	24.0	22.0	21.0	11.0
26	4.5	3.0	.5	.0	.0	1.0	8.5	19.0	---	---	20.5	11.0
27	5.0	2.0	.5	.0	.0	2.0	10.0	19.5	19.0	---	21.0	11.0
28	4.5	2.0	1.0	.0	.0	1.0	10.0	21.0	---	---	22.5	---
29	6.0	2.0	.0	.0	.0	2.0	10.5	21.5	---	23.0	21.0	13.5
30	5.0	.5	1.5	.0	---	3.0	13.0	21.0	22.0	23.0	21.0	13.0
31	6.5	---	.5	.0	---	1.0	---	20.5	---	24.5	20.0	---
MEAN		3.0	.5	.0	.0	.5	5.0					

04040500 STURGEON RIVER NEAR SIDNAW, MI

LOCATION.--Lat 46°35'03", long 88°34'33", in NE¼ SE¼ sec.5, T.48 N., R.34 W., Baraga County, Hydrologic Unit 04020104, on right bank 30 ft (9 m) downstream from highway bridge, 3.0 mi (4.8 km) downstream from Rock River, 3.5 mi (5.6 km) northwest of Covington, 6.5 mi (10.5 km) upstream from Perch River, 8.5 mi (13.7 km) northeast of Sidnaw, and at mile 71 (114 km).

DRAINAGE AREA.--171 mi² (443 km²).

PERIOD OF RECORD.--October 1912 to September 1915, April 1943 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1507: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,214.40 ft (370.149 m) National Geodetic Vertical Datum of 1929. October 1912 to September 1915, nonrecording gage at site 200 ft (61 m) upstream at different datum. Apr. 2, 1943 to Oct. 1, 1946, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--40 years, 213 ft³/s (6.032 m³/s), 16.92 in/yr (430 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,630 ft³/s (131 m³/s) Apr. 24, 1960, gage height, 11.63 ft (3.545 m); minimum, 2.7 ft³/s (0.076 m³/s) Sept. 13, 1976, gage height, 3.17 ft (0.966 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) Apr. 22, gage height, 7.37 ft (2.246 m); minimum, 36 ft³/s (1.02 m³/s) Oct. 1, gage height, 3.91 ft (1.192 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	1030	175	90	76	58	208	472	775	73	93	68
2	40	1000	170	89	74	60	270	416	1090	67	85	97
3	39	836	165	92	72	60	336	368	824	60	71	114
4	40	655	160	90	68	60	285	326	635	52	64	137
5	44	520	157	90	66	60	378	276	464	52	64	122
6	43	444	157	90	66	60	492	215	368	55	59	100
7	44	396	149	92	64	60	785	234	309	82	55	87
8	46	354	143	93	62	60	962	240	309	188	52	75
9	73	300	137	93	60	60	836	258	303	180	47	115
10	89	275	137	94	60	60	740	243	264	117	42	117
11	103	250	137	98	60	62	660	267	215	86	53	108
12	114	230	135	100	62	62	560	255	190	68	64	102
13	135	210	122	105	62	62	476	225	161	59	68	384
14	149	200	121	110	62	62	420	200	212	172	78	976
15	147	192	119	115	60	62	388	180	294	420	86	955
16	159	190	135	120	60	62	357	161	270	410	79	780
17	171	185	130	120	60	68	416	143	225	309	70	575
18	173	185	130	120	60	74	700	130	185	231	65	488
19	198	208	128	120	60	78	969	117	157	215	76	444
20	249	252	126	115	60	80	1200	105	133	258	86	420
21	291	258	117	110	62	85	1320	96	115	282	79	784
22	670	240	112	105	62	82	1370	89	103	261	72	836
23	1340	225	108	100	60	80	1340	80	93	220	64	800
24	1370	212	108	98	60	80	1130	72	83	180	61	685
25	1160	192	108	94	60	80	660	66	73	167	78	655
26	842	185	105	92	60	84	785	58	65	185	102	842
27	710	200	100	90	60	90	705	53	56	165	102	735
28	690	192	97	86	60	100	635	48	58	137	93	620
29	660	182	96	84	58	112	590	47	75	122	82	476
30	665	180	93	82	---	133	525	94	75	114	71	392
31	725	---	89	78	---	167	---	677	---	102	65	---
TOTAL	11217	9978	3966	3055	1816	2363	20498	6211	8179	5089	2226	13089
MEAN	362	333	128	98.5	62.6	76.2	683	200	273	164	71.8	436
MAX	1370	1030	175	120	76	167	1370	677	1090	420	102	976
MIN	38	180	89	78	58	58	208	47	56	52	42	68
CFSM	2.12	1.95	.75	.58	.37	.45	3.99	1.17	1.60	.96	.42	2.55
IN.	2.44	2.17	.86	.66	.40	.51	4.46	1.35	1.78	1.11	.48	2.85

CAL YR 1979 TOTAL 109628 MEAN 300 MAX 3280 MIN 33 CFSM 1.75 IN 23.85
WTR YR 1980 TOTAL 87687 MEAN 240 MAX 1370 MIN 38 CFSM 1.40 IN 19.08

04041500 STURGEON RIVER NEAR ALSTON, MI

LOCATION.--Lat 46°43'35", long 88°39'43", in SE¼ sec.15, T.50 N., R.35 W., Baraga County, Hydrologic Unit 04020104, on right bank in powerhouse of Upper Peninsula Power Co. at Prickett Dam, 4.0 mi (6.4 km) upstream from Clear Creek, 5.0 mi (8.0 km) southeast of Alston, and at mile 45 (72 km).

DRAINAGE AREA.--346 mi² (896 km²).

PERIOD OF RECORD.--February 1932 to June 1941, October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 710.3 ft (216.50 m) mean tide at New York City datum (levels by Corps of Engineers). Prior to Oct. 1, 1963, at datum 40.00 ft (12.192 m) lower.

REMARKS.--Records good except those below 20 ft³/s (0.57 m³/s), which are fair. Flow regulated by powerplant at station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--46 years, (water years 1933-40, 1943-80), 419 ft³/s (11.87 m³/s), 16.45 in/yr (418 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,360 ft³/s (208 m³/s) Apr. 24, 1960, gage height, 13.09 ft (3.990 m) present datum; minimum daily, 1 ft³/s (0.03 m³/s) Aug. 14-19, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,810 ft³/s (136 m³/s) Sept. 14, gage height, 9.97 ft (3.039 m); minimum daily, 14 ft³/s (0.396 m³/s) Feb. 23, 24.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	232	1030	386	15	294	257	266	652	1260	220	275	233
2	234	1590	384	300	271	250	460	653	1440	220	229	230
3	233	1090	328	280	15	259	589	647	1210	224	20	230
4	184	887	328	270	260	241	708	571	1010	224	224	290
5	223	727	353	280	217	270	700	661	749	223	222	280
6	18	653	327	15	226	269	744	443	655	19	225	277
7	18	798	323	280	236	270	1310	438	653	363	226	232
8	230	734	321	270	263	280	1970	444	640	519	226	228
9	228	649	321	270	249	277	1580	444	438	178	20	224
10	232	650	314	250	15	268	1250	440	436	225	20	220
11	230	650	324	250	287	267	972	442	422	255	221	230
12	231	553	294	250	201	266	991	440	422	222	224	229
13	231	406	291	15	255	264	853	442	421	223	228	233
14	232	384	318	240	248	260	642	439	436	443	224	1810
15	232	381	325	260	252	259	638	399	621	633	227	1450
16	286	380	274	250	246	252	637	387	606	632	222	1300
17	287	383	268	250	16	254	638	308	421	632	20	976
18	286	381	273	260	220	249	968	308	369	503	222	710
19	287	382	252	269	220	252	1470	307	324	630	224	810
20	393	383	271	272	219	252	1640	259	322	619	243	930
21	485	384	260	263	221	253	1540	205	321	430	278	1280
22	1030	385	260	273	218	182	1580	257	323	433	276	1530
23	2330	385	15	273	14	250	1540	232	270	430	226	1330
24	1520	385	290	274	14	298	1500	19	270	381	226	1230
25	1570	439	15	273	218	298	1160	19	218	379	229	1130
26	1360	439	270	272	220	295	1040	259	223	381	229	1250
27	1150	439	270	16	223	249	861	251	220	332	229	1190
28	1030	438	270	275	243	248	651	228	19	327	231	1090
29	1010	438	270	275	259	250	653	225	19	329	232	882
30	1020	435	270	275	---	252	653	235	221	328	232	689
31	1020	---	320	288	---	295	---	346	---	273	231	---
TOTAL	18052	17258	8785	7303	5840	8086	30204	11400	14959	11230	6361	22723
MEAN	582	575	283	236	201	261	1007	368	499	362	205	757
MAX	2330	1590	386	300	294	298	1970	661	1440	633	278	1810
MIN	18	380	15	15	14	182	266	19	19	19	20	220
CFSM	1.68	1.66	.82	.68	.58	.75	2.91	1.06	1.44	1.05	.59	2.19
IN.	1.94	1.86	.94	.79	.63	.87	3.25	1.23	1.61	1.21	.68	2.44

CAL YR 1979 TOTAL 197898 MEAN 542 MAX 4210 MIN 15 CFSM 1.57 IN 21.28
WTR YR 1980 TOTAL 162201 MEAN 443 MAX 2330 MIN 14 CFSM 1.28 IN 17.44

04043004 STURGEON RIVER NEAR CHASSELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 46°58'28", long 88°31'21", in NE¼ SW¼ sec.20, T.53 N., R.33 W., Houghton County, Hydrologic Unit 04020104, 2.2 mi (3.5 km) upstream from bridge on county road, 3.5 mi (5.6 km) south of Chassell, and at mile 5.2 (8.4 km).

DRAINAGE AREA.--723 mi^2 (1,873 km^2).

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1978 to current year.
WATER TEMPERATURES: March 1978 to current year.

REMARKS.--Daily record is from once-daily observer samples. In addition, depth-integrated, cross-section samples were collected on a monthly basis. Samples were collected at bridge 2.2 mi (3.5 km) downstream or in the winter, through the ice in the vicinity of the gage site. Diurnal fluctuation and occasional slight regulation by powerplant at Prickett Dam at mile 45 (72 km). Complete ice cover during winter period. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19, 1980; minimum daily, 46 micromhos Apr. 26, 27, 29, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C July 26, 1978, July 13, 1979; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 267 micromhos Feb. 19; minimum daily, 68 micromhos Jan. 5.
WATER TEMPERATURES: Maximum observed, 25.5°C June 25; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
OCT											
03...	1000	500	135	7.6	13.0	9.2	89	--	23	48	67
NOV											
07...	0915	1100	94	7.2	3.5	11.8	91	--	K11	K7	44
DEC											
04...	1130	823	110	7.4	.0	13.2	92	--	K6	--	51
JAN											
17...	1215	583	131	7.5	.0	12.2	86	--	K3	K4	66
FEB											
05...	1130	373	156	7.4	.0	11.4	79	--	K1	K2	75
MAR											
04...	1145	552	148	7.6	.0	11.7	82	17	K1	K2	69
APR											
23...	1130	3370	70	7.4	7.0	10.6	90	--	K11	K6	31
MAY											
22...	1315	604	125	7.8	19.5	8.5	94	26	24	K11	58
JUN											
25...	1030	650	120	7.8	24.0	7.5	90	24	113	123	54
JUL											
22...	1015	870	120	7.6	22.5	7.5	87	50	105	34	61
AUG											
19...	1000	543	170	7.7	20.0	8.2	92	--	37	60	83
SEP											
24...	1000	1860	84	7.3	11.5	9.7	91	69	K14	K32	42

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)
OCT											
03...	7	19	4.8	0	2.2	7	.1	.9	73	0	60
NOV											
07...	5	12	3.4	0	2.2	13	.1	1.0	48	0	39
DEC											
04...	2	14	3.9	--	2.0	11	.1	.8	60	0	49
JAN											
17...	10	18	5.0	0	2.5	11	.1	.9	68	0	56
FEB											
05...	0	21	5.5	0	2.5	9	.1	.9	94	0	77
MAR											
04...	0	19	5.2	--	2.4	7	.1	.8	88	0	72
APR											
23...	3	9.0	2.1	--	1.2	8	.1	.8	34	0	28
MAY											
22...	2	16	4.3	0	2.2	8	.1	.8	74	0	61
JUN											
25...	6	15	4.0	0	1.9	7	.1	.9	68	0	56
JUL											
22...	0	17	4.4	--	2.1	7	.1	.9	72	0	62
AUG											
19...	2	23	6.1	0	2.7	7	.1	1.0	100	0	81
SEP											
24...	3	12	3.0	0	1.6	7	.1	.8	48	0	30

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT										
03...	2.9	3.3	1.8	.1	8.3	99	77	134	--	--
NOV										
07...	4.8	6.2	2.1	.0	8.0	80	59	238	17	96
DEC										
04...	3.8	5.8	1.8	.1	9.3	81	68	180	7	89
JAN										
17...	3.4	4.5	1.5	.1	11	96	78	151	31	100
FEB										
05...	6.0	4.9	1.7	.1	12	103	96	104	0	139
MAR										
04...	3.5	5.6	2.0	.1	11	100	90	149	5	114
APR										
23...	2.2	5.2	1.4	.0	6.4	69	44	628	--	--
MAY										
22...	1.7	4.6	1.6	.1	7.1	90	71	147	10	102
JUN										
25...	1.5	3.9	1.9	.1	6.7	83	63	146	16	97
JUL										
22...	3.0	1.5	1.9	.1	7.0	91	72	214	14	122
AUG										
19...	3.2	3.2	1.5	.1	9.8	97	96	142	5	105
SEP										
24...	2.9	4.1	1.9	.1	8.9	117	57	588	30	124

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)
OCT										
03...	.03	--	.070	--	.08	.37	.44	.47	2.1	.020
NOV										
07...	--	.06	.070	.000	.08	.37	.44	--	--	.020
DEC										
04...	.08	.07	.020	.050	.02	.66	.68	.76	3.4	.020
JAN										
17...	.21	.21	.070	.010	.08	.43	.50	.71	3.1	.020
FEB										
05...	--	.13	.020	.040	.02	.25	.27	.39	1.7	.020
MAR										
04...	.12	.12	.060	.010	.07	.22	.28	.40	1.8	.020
APR										
23...	.14	.14	.020	.020	.02	.38	.40	.54	2.4	.070
MAY										
22...	.03	.03	.020	.030	.02	1.2	1.2	1.2	5.4	.020
JUN										
25...	.04	.04	.080	.020	.10	.36	.44	.48	2.1	.030
JUL										
22...	.05	.04	.040	.010	.05	.40	.44	.49	2.2	.050
AUG										
19...	.04	.04	.070	.020	.08	.36	.43	.47	2.1	.030
SEP										
24...	.07	.07	.030	.030	.04	.55	.58	.65	2.9	.070

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 03...	.06	--	--	--	--	--	--	5	6.7	100
NOV 07...	.06	.010	.000	.00	.000	.000	13	9	27	100
DEC 04...	.06	.010	.040	.12	.000	.000	8.8	10	22	100
JAN 17...	.06	.010	.000	.00	.100	.000	--	4	6.3	100
FEB 05...	.06	.010	.000	.00	.000	.000	8.8	6	6.0	100
MAR 04...	.06	.010	.000	.00	.000	.000	5.3	10	15	100
APR 23...	.21	.010	--	--	.270	.000	8.6	158	1440	--
MAY 22...	.06	.000	.000	.00	1.74	.000	--	16	26	100
JUN 25...	.09	.010	.000	.00	3.03	.000	11	22	39	100
JUL 22...	.15	.050	.000	.00	--	--	11	40	94	100
AUG 19...	.09	.020	--	--	1.90	.000	7.3	--	--	--
SEP 24...	.21	.020	.000	.00	1.67	.000	--	32	161	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)
OCT 03...	1000	2	2	0	30	--	2	10	10	--	1	4
JAN 17...	1215	1	1	--	30	--	1	--	<10	--	6	4
MAY 22...	1315	2	2	<50	40	--	3	10	10	0	0	--
SEP 24...	1000	--	3	<50	0	0	0	20	20	0	0	6

DATE	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)
OCT 03...	1	610	250	3	1	--	50	20	<.5	<.5	1
JAN 17...	2	860	300	0	0	--	30	20	.3	<.1	38
MAY 22...	4	550	230	1	1	--	40	10	<.1	<.1	0
SEP 24...	5	1000	360	5	0	0	50	10	.3	.2	5

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	TI-TANIUM, DIS-SOLVED (UG/L AS TI)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT 03...	0	0	0	0	--	--	9	8.1	.3	--	--
JAN 17...	2	0	0	0	--	30	30	9.4	.3	--	--
MAY 22...	0	0	0	0	--	10	2	17	.1	--	--
SEP 24...	0	0	0	0	<5	70	10	21	.7	.00	4

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
NOV 07...	0915	35	.00	.470	.470	.160	.000
FEB 05...	1130	19	--	.160	.160	.000	.000
JUN 25...	1030	34	744	.551	1.02	.630	.100

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	DEC 6,78 1130	MAR 20,79 1130	APR 25,79 1530	MAY 16,79 1115	JUN 13,79 1100	JUN 27,79 1230
TOTAL CELLS/ML	390	500	1700	400	530	90
DIVERSITY: DIVISION	0.0	1.5	0.5	0.9	0.5	0.9
.CLASS	0.0	1.5	0.5	0.9	0.5	0.9
..ORDER	0.0	2.1	0.8	1.6	1.1	1.1
...FAMILY	0.0	3.1	0.9	3.3	1.2	1.1
....GENUS	0.5	3.1	1.0	3.5	1.2	1.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	13	2	--	-
...CHLOROCOCCACEAE												
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	81#	16	--	-	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-	13	14
....CHLORELLA	--	-	--	-	--	-	56	14	--	-	--	-
....CLOSTERIOPSIS	--	-	5	1	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	10	2	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE												
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	--	-	14	1	28	7	39	7	13	14
...VOLVOCACEAE												
....PANDORINA	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	15	3	--	-	--	-	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	42	10	410#	78	64#	71
....SKELETONEMA	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	28	7	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	28	7	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	14	3	--	-	--	-
...CYMBELLACEAE												
....CYMBELLA	--	-	5	1	28	2	28	7	--	-	--	-
....EPITHEMIA	--	-	--	-	14	1	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	10	2	--	-	--	-	--	-	--	-
...EUNOTIACEAE												
....EUNOTIA	--	-	--	-	--	-	14	3	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	50	10	--	-	84#	21	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	26	5	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	15	3	28	2	14	3	--	-	--	-
...MERIDIONACEAE												
....MERIDION	--	-	15	3	--	-	28	7	--	-	--	-
...NAVICULACEAE												
....CALONEIS	--	-	--	-	14	1	--	-	--	-	--	-
....NAVICULA	--	-	10	2	70	4	14	3	--	-	--	-
....PINNULARIA	--	-	--	-	14	1	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	--	-	5	1	--	-	14	3	39	7	--	-
...TABELLARIACEAE												
....TABELLARIA	--	-	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	DEC 6,78 1130		MAR 20,79 1130		APR 25,79 1530		MAY 16,79 1115		JUN 13,79 1100		JUN 27,79 1230	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	--	-	61	12	84	5	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	61	12	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....LYNGBYA	350#	89	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	43	11	--	-	1500#	85	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	150#	30	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	5	1	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	14	3	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 18,79	AUG 15,79	SEP 12,79	NOV 7,79	MAR 4,80
TIME	1200	1130	1430	0915	1145
TOTAL CELLS/ML	3600	6000	4400	26	65
DIVERSITY: DIVISION	1.4	0.4	0.7	1.0	1.3
.CLASS	1.4	0.4	0.7	1.0	1.3
..ORDER	2.3	0.7	0.9	1.0	1.8
...FAMILY	2.9	1.1	1.7	1.0	2.3
....GENUS	3.2	1.1	1.8	1.0	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	*	0	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	*	0	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	220	6	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	210	5	*	0	*	0	--	-	--	-
....CHLORELLA	--	-	--	-	76	2	--	-	25#	38
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	*	0	--	-	--	-
....SCENEDESMUS	--	-	52	1	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	*	0	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	28	1	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	28	1	*	0	*	0	--	-	10#	15
....MELOSIRA	860#	23	100	2	280	6	--	-	--	-
....SKELETONEMA	--	-	--	-	*	0	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	13#	50	--	-
....COCCONEIS	--	-	--	-	*	0	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	*	0	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	15#	23
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	190	5	--	-	--	-	--	-	--	-
....FRAGILARIA	560	15	52	1	140	3	--	-	--	-
....SYNEDRA	*	0	--	-	*	0	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	5	8
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....CALONEIS	--	-	--	-	--	-	--	-	--	-
....NAVICULA	*	0	*	0	30	1	--	-	5	8
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	140	4	39	1	50	1	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	110	3	--	-	*	0	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 18,79		AUG 15,79		SEP 12,79		NOV 7,79		MAR 4,80	
TIME	1200		1130		1430		0915		1145	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	13*	50	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	#	0	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	560	15	300	5	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	240	6	440	7	900*	21	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	640*	17	5000*	82	2800*	63	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	5	0

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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 22,80		JUN 25,80		JUL 22,80		AUG 19,80		SEP 24,80	
TIME	1315		1030		1015		1000		1000	
TOTAL CELLS/ML	2000		730		810		13000		190	
DIVERSITY: DIVISION	1.6		1.4		1.1		0.1		0.6	
.CLASS	1.7		1.4		1.1		0.1		0.6	
..ORDER	2.4		2.5		1.4		0.3		1.0	
...FAMILY	3.0		2.7		1.6		0.4		1.0	
....GENUS	3.5		2.7		1.6		0.5		1.0	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	13	2	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	170	9	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	130	6	--	-	13	2	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	230	11	--	-	51	6	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	57	3	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	100	14	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	26	3	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	100	14	--	-	*	0	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	13	2	--	-	*	0	--	-
...VOLVOCACEAE										
....PANDORINA	230	11	210#	28	210#	25	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	43	2	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	140	7	13	2	--	-	*	0	13	7
....MELOSIRA	--	-	64	9	--	-	*	0	--	-
....SKELETONEMA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
....EPITHEMIA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	43	2	--	-	--	-	--	-	--	-
....FRAGILARIA	72	4	--	-	490#	60	*	0	--	-
....SYNEDRA	160	8	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....CALONEIS	--	-	--	-	--	-	--	-	--	-
....NAVICULA	14	1	39	5	--	-	--	-	13	7
....PINNULARIA	--	-	--	-	--	-	*	0	--	-
...NITZSCHIACEAE										
....NITZSCHIA	72	4	39	5	--	-	*	0	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	86	4	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
PHYTOPLANKTON

DATE	MAY 22,80		JUN 25,80		JUL 22,80		AUG 19,80		SEP 24,80	
TIME	1315		1030		1015		1000		1000	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	430#	21	150#	21	13	2	410	3	13	7
....GOMPHOSPHAERIA	140	7	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	180	1	150#	80
....APHANIZOMENON	--	-	--	-	--	-	12000#	94	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04043004 STURGEON RIVER NEAR CHASSELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	154	73	---	90	155	158	143	74	---	139	122	157
2	182	72	---	78	182	155	130	72	---	120	120	146
3	184	73	---	130	160	158	118	76	---	120	132	146
4	146	73	---	156	160	168	115	73	---	146	130	145
5	144	73	---	68	164	160	107	78	---	148	154	150
6	142	90	111	119	164	162	102	83	---	150	126	144
7	165	87	118	107	153	162	88	82	---	142	132	136
8	166	86	118	142	150	156	86	86	---	134	138	140
9	165	84	116	134	160	150	75	84	---	---	139	150
10	152	84	112	95	182	160	74	80	---	---	142	152
11	146	88	108	136	214	159	72	82	---	---	142	147
12	148	114	118	80	169	160	72	86	---	---	130	147
13	148	115	128	135	160	162	75	88	---	---	132	146
14	150	114	123	140	164	160	79	98	---	---	131	124
15	154	115	118	141	191	159	80	97	120	---	150	124
16	154	116	116	117	146	158	76	91	92	---	154	124
17	148	117	124	138	149	163	80	91	103	---	150	124
18	148	116	130	133	246	162	81	94	118	---	160	122
19	149	117	130	118	267	171	76	98	121	128	136	124
20	150	117	124	84	156	162	72	114	98	122	170	89
21	108	115	123	110	154	154	74	116	100	118	140	98
22	106	118	126	151	149	159	76	106	100	120	136	90
23	108	114	102	162	148	160	73	106	102	117	156	92
24	104	112	138	158	147	156	74	120	104	113	144	86
25	98	116	144	151	160	158	72	127	102	133	148	88
26	97	110	135	160	164	154	73	144	118	133	146	90
27	98	---	154	152	155	154	69	144	124	132	152	84
28	96	---	144	158	164	152	72	146	130	112	152	83
29	79	---	125	230	155	150	74	117	130	114	164	---
30	78	---	---	207	---	147	74	124	139	122	164	---
31	80	---	120	171	---	142	---	114	---	120	143	---
MEAN	134			134	169	158	84	100			143	

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15.0	4.0	---	.0	.0	.0	.0	11.0	---	22.0	23.0	20.5
2	14.0	4.0	---	.5	.0	.0	.0	12.0	---	21.0	24.0	20.0
3	14.0	---	---	.0	.0	.0	.0	12.5	---	21.5	23.0	19.5
4	13.0	4.0	---	.0	.0	.0	.0	12.5	---	21.0	23.5	19.5
5	13.0	4.0	---	.0	.0	.0	.0	16.0	---	21.0	23.0	19.5
6	13.0	4.0	1.5	.0	.0	.0	.0	13.5	---	22.0	23.0	19.5
7	13.0	4.0	2.0	.0	.0	.0	1.0	11.5	---	22.5	23.5	20.0
8	13.0	4.0	.5	.5	.0	.0	1.5	10.5	---	22.0	24.0	21.0
9	13.0	3.0	.5	.0	.0	.0	1.0	11.0	---	---	23.5	20.5
10	12.0	3.0	.5	.0	.0	.0	1.5	12.0	---	---	23.5	20.0
11	11.0	3.0	.0	.0	.0	.0	2.0	12.0	---	---	23.0	19.0
12	10.0	4.0	.0	.0	.0	.0	2.0	13.5	---	---	22.5	18.5
13	9.0	4.0	.5	.0	.0	.0	2.0	13.5	---	---	22.0	18.0
14	8.0	4.0	.0	.0	.0	.0	3.0	14.0	---	---	23.0	17.0
15	9.0	3.0	.5	.0	.0	.0	5.0	13.5	17.0	---	23.0	16.5
16	9.0	3.0	.0	.0	.0	.0	4.5	14.0	18.5	---	22.0	15.0
17	9.0	4.0	1.0	.0	.0	.0	6.0	15.0	18.0	---	21.5	14.5
18	9.0	4.0	.0	.0	.0	.0	6.0	16.0	19.0	---	22.0	14.0
19	9.0	4.0	1.0	.0	.0	.0	5.5	17.0	19.5	23.0	21.5	14.0
20	9.0	4.0	1.0	.0	.0	.0	6.0	17.0	19.0	23.5	21.0	13.5
21	8.0	4.0	.0	.0	.0	.0	6.0	17.5	19.0	23.0	21.0	13.0
22	8.0	4.0	.5	.0	.0	.0	6.5	19.5	19.0	23.0	21.5	12.5
23	7.0	3.0	1.0	.0	.0	.0	6.0	22.0	21.0	23.0	21.0	13.0
24	7.0	3.0	.0	.0	.0	.0	5.5	23.0	23.0	24.0	21.0	12.5
25	6.0	3.0	.0	.0	.0	.0	---	19.5	25.5	23.0	21.5	11.5
26	6.0	3.0	.0	.0	.0	.0	6.5	18.5	23.5	23.5	22.0	11.5
27	6.0	---	1.0	.0	.0	.0	7.0	18.0	23.0	22.5	21.5	11.0
28	6.0	---	.0	.0	.0	.0	7.5	18.5	21.5	23.0	21.0	12.5
29	5.0	---	.0	.0	.0	.0	9.0	19.5	21.0	23.5	21.0	---
30	5.0	---	.0	.0	---	.0	11.0	19.0	21.5	23.0	22.0	---
31	5.0	---	2.0	.0	---	.0	---	19.0	---	22.5	21.0	---
MEAN	9.5			.0	.0	.0		15.5			22.5	

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI

LOCATION.--Lat 47°13'43", long 88°23'07", in SE¼ SE¼ sec.20, T.56 N., R.32 W., Houghton County, Hydrologic Unit 04020103, on right bank 20 ft (6 m) upstream from bridge on county highway, 2.0 mi (3.2 km) northeast of Lake Linden, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--28.0 mi² (72.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 621.7 ft (189.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. From April 1973 to December 1977, flow includes about 0.1 ft³/s (0.003 m³/s) mine pumpage. Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--14 years, 44.5 ft³/s (1.260 m³/s), 21.58 in/yr (548 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,590 ft³/s (45.0 m³/s) May 10, 1979, gage height, 10.72 ft (3.267 m); minimum daily, 6.8 ft³/s (0.19 m³/s) Oct. 3, 1976; minimum gage height, 3.85 ft (1.173 m) June 23, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 380 ft³/s (10.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 8	0300	552	15.6	7.26	2.213	Apr. 20	0100	*760	21.5	*8.24	2.512

Minimum discharge, 11.0 ft³/s (0.31 m³/s) Aug. 4, 6, 7, 8, gage height, 3.91 ft (1.192 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	148	42	24	20	20	56	86	75	23	12	15
2	17	117	39	24	20	21	72	69	226	19	12	21
3	18	87	37	23	20	21	85	59	104	16	12	19
4	17	71	35	22	20	19	79	50	53	15	12	18
5	16	60	40	22	20	18	121	42	39	17	12	16
6	15	52	53	22	20	18	182	39	31	16	12	14
7	15	46	45	24	20	18	362	39	27	15	11	14
8	15	45	40	23	20	18	480	38	28	15	12	16
9	15	42	35	23	20	18	265	43	27	14	13	24
10	18	39	32	26	20	18	180	39	23	14	12	23
11	19	38	31	25	20	18	132	53	21	13	12	21
12	24	37	31	27	20	18	101	41	20	13	12	22
13	36	36	30	29	20	18	82	34	21	13	20	37
14	28	34	28	28	20	18	71	31	20	21	19	51
15	24	35	27	28	20	17	73	29	21	20	15	41
16	21	35	28	30	20	18	75	27	20	16	14	19
17	19	60	27	31	20	20	138	25	18	16	13	17
18	18	64	26	28	21	21	327	25	18	16	13	23
19	46	60	26	26	21	22	506	24	17	17	17	30
20	59	75	26	25	20	26	551	24	16	16	21	48
21	38	59	26	26	19	26	495	22	16	16	30	51
22	116	47	26	25	19	31	501	20	16	15	23	44
23	262	43	26	24	20	23	402	19	16	14	18	30
24	146	42	27	23	19	22	203	19	15	13	16	25
25	92	37	27	22	19	22	169	18	15	14	17	32
26	71	58	26	21	19	22	181	16	14	14	15	60
27	68	97	25	21	20	25	183	16	14	15	14	40
28	111	66	24	21	20	25	148	16	18	13	13	28
29	114	54	24	21	20	29	128	18	28	13	13	23
30	108	46	25	21	---	36	111	23	28	13	15	21
31	109	---	24	21	---	44	---	77	---	13	15	---
TOTAL	1690	1730	958	756	577	690	6459	1081	1005	478	465	843
MEAN	54.5	57.7	30.9	24.4	19.9	22.3	215	34.9	33.5	15.4	15.0	28.1
MAX	262	148	53	31	21	44	551	86	226	23	30	60
MIN	15	34	24	21	19	17	56	16	14	13	11	14
CFSM	1.95	2.06	1.10	.87	.71	.80	7.68	1.25	1.20	.55	.54	1.00
IN.	2.25	2.30	1.27	1.00	.77	.92	8.58	1.44	1.34	.64	.62	1.12

CAL YR 1979 TOTAL 25139 MEAN 68.9 MAX 1120 MIN 14 CFSM 2.46 IN 33.40
WTR YR 1980 TOTAL 16732 MEAN 45.7 MAX 551 MIN 11 CFSM 1.63 IN 22.23

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Oct. 1, 1971.

REMARKS.--Temperature recorder malfunctioned July 23, 24, Aug. 4 to Sept. 16 (apparent maximum for period, 21.0°C Aug. 6, 7, from fragmentary record).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 30, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 23.0°C July 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	12.0	11.0	7.0	6.0	1.0	1.0	2.0	2.0	.0	.0	.0	.0
2	12.5	11.0	6.0	4.5	1.0	1.0	2.0	.5	.0	.0	.0	.0
3	12.0	11.0	4.5	4.0	1.0	1.0	.5	.0	.0	.0	.0	.0
4	11.0	10.0	4.5	4.0	1.5	1.0	.0	.0	.0	.0	.0	.0
5	10.0	8.5	5.0	4.5	2.5	1.5	.0	.0	.0	.0	.0	.0
6	9.5	9.0	4.5	3.5	2.0	2.0	.0	.0	.0	.0	.0	.0
7	9.0	8.0	4.0	3.5	2.0	1.5	.0	.0	.0	.0	.0	.0
8	8.0	8.0	3.5	2.0	1.5	1.0	.0	.0	.0	.0	.0	.0
9	8.0	7.0	2.0	1.5	1.0	1.0	.5	.5	.0	.0	.0	.0
10	7.5	6.0	2.0	1.5	2.0	1.0	.5	.5	.0	.0	.0	.0
11	7.0	6.0	1.5	1.0	2.0	1.5	.5	.5	.0	.0	.0	.0
12	6.5	5.0	2.5	1.0	1.5	1.0	.5	.5	.0	.0	.0	.0
13	5.5	4.5	2.0	1.5	1.0	1.0	.5	.0	.0	.0	.0	.0
14	5.5	4.5	2.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
15	7.0	5.5	3.0	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
16	7.5	5.5	3.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
17	7.5	6.0	3.5	2.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
18	7.0	4.5	3.0	2.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
19	8.0	6.5	3.5	3.0	1.0	1.0	.0	.0	.0	.0	2.5	.5
20	9.5	8.0	4.0	3.5	1.0	1.0	.0	.0	.0	.0	2.5	1.5
21	9.5	8.5	3.5	3.0	1.5	1.0	.0	.0	.0	.0	2.0	.5
22	8.5	6.5	3.5	3.0	2.5	1.5	.0	.0	.5	.0	2.0	.5
23	6.5	3.0	3.5	3.0	3.0	2.5	.0	.0	.5	.5	2.5	1.0
24	3.5	2.5	3.5	2.5	3.0	2.5	.0	.0	.5	.0	2.0	1.0
25	3.5	3.5	2.5	1.5	2.5	2.0	.0	.0	.0	.0	4.0	1.0
26	4.5	3.5	2.5	2.5	1.5	1.5	.0	.0	.0	.0	3.5	.5
27	4.5	4.5	2.5	1.5	2.0	1.0	.0	.0	.0	.0	3.0	1.0
28	5.0	4.5	1.5	1.5	2.0	1.5	.0	.0	.0	.0	4.5	1.0
29	5.5	4.5	1.5	1.0	1.5	1.0	.0	.0	.0	.0	4.5	1.5
30	5.5	4.5	1.0	1.0	1.5	1.0	.0	.0	---	---	4.0	1.0
31	7.0	5.5	---	---	2.0	1.5	.0	.0	---	---	3.5	1.0
MONTH	12.5	2.5	7.0	1.0	3.0	1.0	2.0	.0	.5	.0	4.5	.0

04043050 TRAP ROCK RIVER NEAR LAKE LINDEN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	1.5	13.5	9.5	14.5	12.0	19.0	14.5	21.0		---	---
2	3.0	.5	14.0	10.0	13.5	11.5	19.0	14.0	21.0		---	---
3	2.0	.5	14.5	11.0	15.5	12.0	21.0	15.0	20.5		---	---
4	4.0	1.0	15.0	11.0	16.0	12.5	20.0	17.0	---		---	---
5	3.0	1.0	15.0	12.5	14.5	13.0	18.5	16.0	---		---	---
6	1.0	.5	12.5	10.0	16.5	12.0	19.5	14.5	---		---	---
7	1.5	.5	9.0	8.0	15.5	11.5	20.0	16.0	---		---	---
8	.5	.5	9.0	7.5	14.0	9.5	20.5	16.0	---		---	---
9	.5	.5	10.5	7.5	15.5	11.5	21.5	16.5	---		---	---
10	1.5	.5	9.5	9.0	15.0	10.5	21.0	18.0	---		---	---
11	2.5	1.5	11.5	8.0	16.5	10.5	21.0	17.5	---		---	---
12	3.0	1.5	13.0	9.0	17.0	12.0	20.0	16.5	---		---	---
13	2.5	1.5	12.0	9.5	19.5	14.5	20.5	16.5	---		---	---
14	3.5	1.5	13.5	9.5	18.0	14.0	21.0	17.5	---		---	---
15	5.0	2.5	15.0	10.0	16.5	12.0	23.0	18.0	---		---	---
16	5.0	1.5	15.5	10.0	17.5	11.5	22.0	18.5	---		---	---
17	5.5	2.5	15.5	11.0	17.0	13.0	21.5	16.5	---		13.0	10.0
18	5.0	1.5	16.0	11.0	16.0	13.0	20.5	17.0	---		11.5	10.5
19	4.5	1.5	16.5	11.0	17.5	12.5	20.5	16.0	---		11.0	10.0
20	6.0	1.0	17.5	11.0	18.5	13.0	21.0	17.5	---		12.0	10.5
21	7.5	2.0	18.5	13.5	17.5	14.5	21.0	17.5	---		11.5	11.0
22	8.0	3.5	19.0	14.5	19.5	14.0	20.5	17.5	---		13.0	11.0
23	7.0	3.0	19.0	14.0	21.0	15.0	20.5	---	---		12.0	10.5
24	3.0	2.0	19.0	14.0	21.5	16.5	21.5	---	---		11.0	10.0
25	5.5	3.0	18.0	14.0	22.5	18.0	21.0	17.5	---		10.5	9.5
26	6.5	5.0	16.0	12.0	21.5	17.5	19.5	15.0	---		10.5	9.0
27	8.0	5.0	17.0	12.0	17.5	14.5	19.5	14.5	---		10.5	9.0
28	8.0	5.5	17.5	13.0	15.5	13.0	19.5	16.0	---		10.5	8.0
29	9.5	7.0	16.0	13.5	15.5	13.5	21.0	16.5	---		13.0	9.5
30	12.5	9.0	16.0	14.0	16.5	12.5	19.5	16.0	---		13.0	11.5
31	---	---	15.0	13.0	---	---	20.5	16.0	---		---	---
MONTH	12.5	.5	19.0	7.5	22.5	9.5	23.0	14.0	21.0		13.0	8.0

04044400 CARP RIVER NEAR NEGAUNEE, MI

LOCATION.--Lat 46°31'29", long 87°34'25", in SE¼ sec.29, T.48 N., R.26 W., Marquette County, Hydrologic Unit 04020105, on right bank 30 ft (9 m) downstream from bridge on U.S. Highway 41, and 2.0 mi (3.2 km) northeast of Negaunee.

DRAINAGE AREA.--51.4 mi² (133.1 km²).

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,319.90 ft (402.306 m) Michigan Department of Highway and Transportation datum. Prior to Aug. 24, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by Deer Lake storage reservoir (capacity, 22,500 acre-ft or 27.7 hm³) 5 mi (8 km) upstream. The city of Ishpeming diverted an average of 2.2 ft³/s (0.062 m³/s) into basin as waste effluent (station 04058200). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--19 years, 61.2 ft³/s (1.733 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 351 ft³/s (9.94 m³/s) June 27, 28, 1968, gage height, 4.68 ft (1.426 m); maximum gage height, 5.24 ft (1.597 m) Mar. 2, 1972, backwater from ice; minimum discharge, 3.7 ft³/s (0.10 m³/s) July 29, 1965; minimum gage height, 1.94 ft (0.591 m) Aug. 1, 1962; minimum daily discharge, 3.9 ft³/s (0.11 m³/s) July 29, 30, 1965.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 201 ft³/s (5.69 m³/s) Oct. 23, gage height, 3.92 ft (1.195 m); maximum gage height, 4.24 ft (1.292 m) Jan. 10, backwater from ice; minimum, 16 ft³/s (0.45 m³/s) July 30, Aug. 2, 4, gage height, 2.33 ft (0.710 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	57	99	58	86	80	78	84	50	50	34	21	21
2	58	90	57	86	80	78	88	46	46	33	20	22
3	58	74	57	85	80	75	83	43	39	32	20	22
4	58	68	56	85	79	73	58	41	35	32	20	22
5	58	66	56	85	80	73	68	39	34	34	64	20
6	57	69	55	84	81	73	76	37	35	33	43	20
7	57	65	56	85	78	72	95	38	52	36	26	19
8	58	63	56	85	78	72	114	38	68	35	23	19
9	59	61	56	85	78	72	121	38	46	32	22	24
10	60	60	54	85	78	72	106	37	39	24	22	22
11	59	60	54	85	78	64	82	39	36	21	25	20
12	60	59	54	57	77	72	68	36	35	21	25	22
13	67	57	53	88	77	72	60	35	35	21	22	32
14	67	57	54	90	78	71	57	35	53	25	22	62
15	65	57	54	90	77	74	55	34	44	26	22	52
16	66	57	54	91	79	71	53	33	37	23	20	33
17	64	57	56	92	79	73	61	34	35	22	20	27
18	62	58	56	89	78	72	91	34	34	22	21	28
19	58	60	68	87	76	73	117	33	33	25	21	29
20	55	67	84	86	76	76	136	33	32	31	21	29
21	57	63	87	86	76	75	116	32	32	32	20	59
22	111	63	88	85	76	73	105	32	32	25	20	71
23	192	62	88	86	75	73	94	32	32	23	19	43
24	139	62	89	84	75	73	69	32	32	22	20	33
25	91	59	90	84	76	72	64	31	32	26	25	37
26	75	59	88	83	76	72	80	31	31	25	23	58
27	74	59	88	81	76	74	76	31	32	22	21	49
28	93	59	87	82	76	73	61	31	33	21	20	36
29	91	59	86	82	48	75	57	31	36	21	20	30
30	86	58	86	80	---	78	57	34	35	20	20	28
31	86	---	86	80	---	81	---	57	---	21	20	---
TOTAL	2296	1907	2111	2619	2221	2275	2452	1127	1145	820	728	989
MEAN	74.1	63.6	68.1	84.5	76.6	73.4	81.7	36.4	38.2	26.5	23.5	33.0
MAX	192	99	90	92	81	81	136	57	69	36	64	71
MIN	55	57	53	57	48	64	53	31	31	20	19	19

CAL YR 1979 TOTAL 30485 MEAN 83.5 MAX 268 MIN 37
WTR YR 1980 TOTAL 20690 MEAN 56.5 MAX 192 MIN 19

04044563 BIG CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°26'04", long 87°19'04", in SE¼ SW¼ sec.28, T.47 N., R.24 W., Marquette County, Hydrologic Unit 04020201, on left bank 5 ft (2 m) upstream from culverts on county highway, 5.0 mi (8.0 km) southeast of Harvey.

DRAINAGE AREA.--17.0 mi² (44.0 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1964-70. June 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 670 ft (204 m) from topographic map (nearest 10 ft). Oct. 25, 1963 to June 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those above 50 ft³/s (1.42 m³/s) and those for period of no gage-height record, Aug. 12, 1979 to Sept. 25, 1979, which are fair. Water quality data for 1980 water year published under "Analyses of samples collected at miscellaneous sites."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 170 ft³/s (4.81 m³/s) June 17, 1979, gage height, 4.79 ft (1.460 m), from rating curve extended above 41 ft³/s (1.16 m³/s); minimum observed, 23 ft³/s (0.65 m³/s) Sept. 8, 1966, discharge measurement.

EXTREMES FOR CURRENT PERIOD.--June to Septmeber 1979: Maximum discharge during period, 170 ft³/s (4.81 m³/s) June 17, gage height, 4.79 ft (1.460 m), from rating curve extended above 41 ft³/s (1.16 m³/s); minimum recorded, 27 ft³/s (0.76 m³/s) July 3, 4, 5, 6, 7, 9, gage height, 2.40 ft (0.732 m) but may have been less during period of no gage-height record Aug. 12 to Sept. 25.

Water year 1980: Maximum discharge, 130 ft³/s (3.68 m³/s) Apr. 9, gage height, 4.18 ft (1.274 m), from rating curve extended above 41 ft³/s (1.16 m³/s); minimum recorded, 25 ft³/s (0.71 m³/s) Dec. 16, gage height, 2.34 ft (0.713 m) but may have been less during periods of no gage-height record Jan. 2-23, Feb. 6 to Mar. 4, May 11-19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									30	28	30	28
2									30	28	29	28
3									30	28	29	28
4									30	27	34	28
5									30	28	31	29
6									30	28	29	29
7									30	27	28	29
8									30	28	28	29
9									31	28	28	29
10									40	28	28	29
11									33	28	28	30
12									31	29	28	30
13									30	31	28	29
14									30	38	28	29
15									32	28	28	29
16									35	28	28	29
17									75	28	28	29
18									32	28	28	29
19									30	29	28	29
20									31	28	28	29
21									34	28	28	29
22									31	28	28	29
23									29	28	28	29
24									29	29	28	29
25									29	41	28	29
26									29	31	28	29
27									30	38	28	29
28									28	30	28	29
29									28	29	28	29
30									28	51	29	29
31									---	39	29	---
TOTAL	---	---	---	---	---	---	---	---	965	945	884	868
MEAN	---	---	---	---	---	---	---	---	32.2	30.5	28.5	28.9
MAX	---	---	---	---	---	---	---	---	75	51	34	30
MIN	---	---	---	---	---	---	---	---	28	27	28	28
CFSM	---	---	---	---	---	---	---	---	1.89	1.79	1.68	1.70
IN.	---	---	---	---	---	---	---	---	2.11	2.07	1.93	1.90

04044563 BIG CREEK NEAR HARVEY, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	41	31	30	28	30	36	32	30	30	28	31
2	29	32	30	30	28	30	37	31	32	29	27	31
3	29	31	31	30	28	30	35	31	29	28	27	30
4	29	31	31	30	28	30	35	31	29	28	28	29
5	29	31	31	30	28	30	40	30	29	29	33	28
6	29	33	31	30	28	30	41	30	30	28	28	28
7	32	31	31	30	28	30	51	31	29	29	28	28
8	30	31	30	30	29	30	70	31	30	28	28	28
9	32	31	30	30	29	30	82	31	29	28	27	30
10	30	31	31	30	29	31	42	31	29	28	27	28
11	30	30	31	30	29	30	37	31	28	28	28	28
12	31	30	30	30	29	30	35	31	28	28	28	29
13	38	30	30	30	29	30	34	30	28	28	28	52
14	32	31	29	30	29	30	34	30	32	31	28	48
15	30	31	29	30	29	30	34	30	30	29	30	30
16	30	31	28	30	29	31	33	30	29	28	28	30
17	30	31	27	30	29	32	35	30	29	28	28	29
18	30	31	29	30	29	31	38	30	28	28	28	31
19	30	32	29	30	29	32	39	29	29	28	28	29
20	30	32	29	30	29	34	36	29	29	33	28	30
21	33	33	29	30	29	33	34	29	28	29	28	60
22	61	41	30	30	29	32	34	29	28	29	27	32
23	70	34	31	30	30	32	33	28	28	28	27	30
24	65	32	32	29	30	32	34	28	28	28	31	31
25	34	31	31	28	30	32	37	28	28	31	31	34
26	32	50	31	28	30	32	39	28	28	28	28	36
27	37	40	30	28	30	32	34	28	28	28	28	30
28	40	33	30	28	30	32	33	28	29	28	28	29
29	34	32	30	28	30	33	34	28	30	28	28	29
30	32	31	29	28	---	35	33	29	29	28	28	28
31	32	---	29	28	---	35	---	36	---	28	28	---
TOTAL	1059	989	930	915	841	971	1169	928	870	887	875	966
MEAN	34.2	33.0	30.0	29.5	29.0	31.3	39.0	29.9	29.0	28.6	28.2	32.2
MAX	70	50	32	30	30	35	82	36	32	33	33	60
MIN	29	30	27	28	28	30	33	28	28	28	27	28
CFSM	2.01	1.94	1.77	1.74	1.71	1.84	2.29	1.76	1.71	1.68	1.66	1.89
IN.	2.32	2.16	2.03	2.00	1.86	2.12	2.56	2.03	1.90	1.94	1.91	2.11

WTR YR 1980 TOTAL 11400 MEAN 31.1 MAX 82 MIN 27 CFSM 1.83 IN 24.94

04044573 CEDAR CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°27'20", long 87°21'42", in NW¼ SW¼ sec.19, T.47 N., R.24 W., Marquette County, Hydrologic Unit 04020201, on right bank 60 ft (18 m) upstream from man-made rock dam, 0.3 mi (0.5 km) upstream from county highway and 2.5 mi (4.0 km) south of Harvey.

DRAINAGE AREA.--9.04 mi^2 (23.41 km^2).

PERIOD OF RECORD.--June 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those above 20 ft^3/s (0.57 m^3/s), which are fair. Water quality data for 1980 water year published under "Analyses for samples collected at miscellaneous sites."

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 10.2 ft^3/s (0.29 m^3/s) was measured July 21, 1964, at site 0.3 mi (0.5 km) downstream, drainage area, 9.17 mi^2 (23.75 km^2).

EXTREMES FOR CURRENT PERIOD.--June to September 1979: Maximum discharge during period, 34 ft^3/s (0.96 m^3/s) July 30, gage height, 1.27 ft (0.387 m); minimum, 12 ft^3/s (0.34 m^3/s) on many days.

Water year 1980: Maximum discharge, 32 ft^3/s (0.91 m^3/s) Sept. 13, gage height, 1.25 ft (0.381 ft); minimum, 11 ft^3/s (0.31 m^3/s) on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									12	12	14	13
2									12	12	14	13
3									12	12	14	13
4									12	12	16	12
5									12	12	14	12
6									12	12	13	13
7									12	12	13	12
8									12	12	13	12
9									12	12	13	12
10									16	12	13	12
11									13	12	13	14
12									12	12	13	12
13									12	14	13	12
14									12	14	13	12
15									13	13	13	12
16									15	12	13	12
17									18	12	13	12
18									14	12	13	12
19									12	12	12	12
20									12	12	12	12
21									12	12	12	12
22									12	13	12	12
23									12	13	13	12
24									12	14	13	12
25									12	16	13	12
26									12	14	13	12
27									12	15	12	12
28									12	14	12	12
29									12	13	13	12
30									12	19	12	12
31									---	15	14	---
TOTAL	---	---	---	---	---	---	---	---	377	403	404	366
MEAN	---	---	---	---	---	---	---	---	12.6	13.0	13.0	12.2
MAX	---	---	---	---	---	---	---	---	18	19	16	14
MIN	---	---	---	---	---	---	---	---	12	12	12	12
CFSM	---	---	---	---	---	---	---	---	1.39	1.44	1.44	1.35
IN.	---	---	---	---	---	---	---	---	1.55	1.66	1.66	1.51

04044573 CEDAR CREEK NEAR HARVEY, MI--CONTINUED

DISCHARGE, IN CURIC FFET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	14	14	14	12	12	12	12	13	14	11	12
2	12	13	14	14	12	12	12	12	13	13	11	12
3	12	13	14	13	12	12	12	12	13	13	11	12
4	12	14	14	12	12	12	12	12	13	13	11	12
5	12	14	13	12	12	12	12	12	13	14	11	12
6	12	14	14	12	12	12	13	13	13	13	11	12
7	13	14	13	12	12	12	13	13	13	13	11	11
8	13	14	13	12	12	12	20	13	13	13	11	11
9	13	14	13	12	12	12	20	13	13	12	11	12
10	13	14	13	12	12	12	16	13	13	12	11	12
11	13	14	14	11	12	12	14	13	12	13	11	12
12	14	14	13	11	11	12	14	13	12	13	11	12
13	15	14	13	11	11	12	14	13	14	13	11	18
14	13	14	12	11	12	12	14	13	14	14	11	15
15	13	14	13	11	12	11	14	13	13	13	12	12
16	13	14	13	12	12	12	14	13	13	13	11	12
17	13	14	12	12	12	11	14	13	13	13	11	12
18	13	14	12	12	12	11	14	13	13	13	11	12
19	13	14	12	12	12	11	14	13	13	12	11	12
20	13	13	12	12	12	11	13	13	13	14	11	12
21	12	14	12	12	12	11	13	13	13	13	11	18
22	16	14	12	12	12	11	13	13	13	12	11	13
23	17	14	13	12	12	11	13	13	13	12	11	12
24	14	13	13	12	12	11	14	13	13	12	12	13
25	13	14	13	12	11	12	14	13	13	13	12	14
26	13	18	13	12	12	11	14	13	12	12	11	14
27	14	14	13	12	12	12	13	13	13	12	11	13
28	13	14	13	12	12	12	13	12	13	12	11	13
29	13	14	13	12	12	12	13	13	14	12	12	13
30	13	14	13	12	---	11	13	13	13	11	12	13
31	13	---	13	12	---	11	---	15	---	11	12	---
TOTAL	408	420	402	372	345	360	414	399	390	393	347	383
MEAN	13.2	14.0	13.0	12.0	11.9	11.6	13.8	12.9	13.0	12.7	11.2	12.8
MAX	17	18	14	14	12	12	20	15	14	14	12	18
MIN	12	13	12	11	11	11	12	12	12	11	11	11
CFSM	1.46	1.55	1.44	1.33	1.32	1.28	1.53	1.43	1.44	1.41	1.24	1.42
IN.	1.68	1.73	1.65	1.53	1.42	1.48	1.70	1.64	1.60	1.62	1.43	1.58

WTR YR 1980 TOTAL 4633 MEAN 12.7 MAX 20 MIN 11 CFSM 1.41 IN 19.06

04044583 CHERRY CREEK NEAR HARVEY, MI

LOCATION.--Lat 46°27'57" (corrected), long 87°21'53", in NE¼ SE¼ sec.13, T.47 N., R.25 W., Marquette County, Hydrologic Unit 04020201, on left bank 0.5 mi (0.8 km) upstream from County Highway 551, 2.0 mi (3.2 km) south of Harvey.

DRAINAGE AREA.--4.53 mi^2 (11.73 km^2).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1971-79. October 1965 to September 1970, June 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 670 ft (204 m) from topographic map (nearest 10 ft). Oct. 7, 1978 to May 23, 1979, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record July 21, 1980 to Sept. 11, 1980, which are fair. Water quality data for 1980 water year published under "Analyses of samples collected at miscellaneous sites."

AVERAGE DISCHARGE.--6 years, (water years 1966-70, 1980), 18.9 ft^3/s (0.535 m^3/s), 56.66 in/yr (1,439 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 37 ft^3/s (1.04 m^3/s) May 30, 1970; maximum gage height, 4.28 ft (1.305 m) Dec. 4, 1980, backwater from debris; minimum discharge, 16 ft^3/s (0.45 m^3/s) Jan. 25, 1967; minimum gage height, 2.24 ft (0.683 m) July 28, 1970 (stop logs removed).

EXTREMES FOR CURRENT PERIOD.--June to September 1979: Maximum discharge during period, 30 ft^3/s (0.85 m^3/s) June 16, gage height, 3.91 ft (1.192 m); minimum, 19 ft^3/s (0.54 m^3/s) on many days; minimum gage height, 3.23 ft (0.985 m) Aug. 21.

Water year 1980: Maximum discharge, 31 ft^3/s (0.88 m^3/s) Sept. 13; maximum gage height, 4.28 ft (1.305 m) Dec. 4, backwater from debris; minimum discharge, 19 ft^3/s (0.54 m^3/s) on many days; minimum gage height, 3.22 ft (0.981 m) July 12, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									19	19	19	20
2									19	19	19	19
3									19	19	19	19
4									19	19	20	19
5									19	19	20	20
6									19	19	19	20
7									19	19	20	20
8									19	19	19	19
9									19	19	19	19
10									20	19	19	20
11									19	19	19	20
12									19	19	19	20
13									19	20	20	20
14									19	20	19	20
15									19	19	19	19
16									20	19	19	19
17									21	19	20	19
18									19	19	19	20
19									19	19	20	20
20									19	19	19	20
21									19	19	19	20
22									19	19	19	20
23									19	19	20	20
24									19	20	20	20
25									19	21	19	20
26									19	20	19	20
27									19	20	19	20
28									19	20	19	20
29									19	20	20	20
30									19	19	19	20
31									---	22	20	---
TOTAL	---	---	---	---	---	---	---	---	574	601	599	592
MEAN	---	---	---	---	---	---	---	---	19.1	19.4	19.3	19.7
MAX	---	---	---	---	---	---	---	---	21	22	20	20
MIN	---	---	---	---	---	---	---	---	19	19	19	19
CFSM	---	---	---	---	---	---	---	---	4.22	4.28	4.26	4.35
IN.	---	---	---	---	---	---	---	---	4.71	4.93	4.92	4.86

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	21	20	20	20	20	20	20	20	20	19	20
2	20	21	20	20	20	20	20	20	20	20	19	20
3	20	21	20	20	20	20	20	20	20	20	19	20
4	20	21	20	20	20	20	20	20	20	19	19	20
5	20	21	20	20	20	20	21	20	20	20	19	20
6	20	21	20	20	20	20	21	20	20	20	19	20
7	20	21	20	20	20	20	21	20	20	20	19	20
8	20	21	20	20	20	20	22	20	20	19	19	20
9	20	21	20	20	20	20	23	20	20	19	19	20
10	21	21	20	20	20	20	21	20	20	19	19	20
11	21	21	20	20	19	20	21	20	20	19	19	20
12	21	21	20	20	19	20	20	20	20	19	19	20
13	21	21	20	20	20	20	20	20	20	19	19	22
14	21	21	20	20	19	20	20	20	20	20	19	21
15	21	21	20	20	19	20	20	20	20	19	19	20
16	21	21	20	20	20	20	20	20	20	19	19	20
17	21	21	20	20	20	20	20	20	20	19	19	19
18	21	21	20	20	20	20	20	20	20	19	19	20
19	21	21	20	20	20	20	20	20	20	19	19	20
20	21	21	20	20	20	20	20	20	20	20	19	20
21	22	21	20	20	20	20	20	20	20	20	19	21
22	24	21	20	20	20	20	20	20	20	20	19	20
23	23	21	20	20	20	20	20	20	20	20	19	20
24	22	21	20	20	20	20	21	20	20	20	20	20
25	21	21	20	20	20	20	21	20	20	20	20	20
26	21	22	20	20	20	20	21	20	20	20	20	20
27	21	21	20	20	20	20	21	20	20	20	20	20
28	21	21	20	20	20	20	20	20	20	20	20	20
29	21	20	20	20	20	20	20	20	20	19	20	20
30	21	20	20	20	---	20	20	20	20	19	20	20
31	21	---	20	20	---	20	---	21	---	19	20	---
TOTAL	649	629	620	620	576	620	614	621	600	605	597	603
MEAN	20.9	21.0	20.0	20.0	19.9	20.0	20.5	20.0	20.0	19.5	19.3	20.1
MAX	24	22	20	20	20	20	23	21	20	20	20	22
MIN	20	20	20	20	19	20	20	20	20	19	19	19
CFSM	4.61	4.64	4.42	4.42	4.39	4.42	4.53	4.42	4.42	4.31	4.26	4.44
IN.	5.33	5.16	5.09	5.09	4.73	5.09	5.04	5.10	4.93	4.97	4.90	4.95

WTR YR 1980 TOTAL 7354 MEAN 20.1 MAX 24 MIN 19 CFSM 4.44 IN 60.38

04044595 SILVER CREEK AT HARVEY, MI

LOCATION.--Lat 46°29'24", long 87°22'19", in NW¼ NE¼ sec.12, T.47 N., R.25 W., Marquette County, Hydrologic Unit 04020201, on right bank 15 ft (5 m) upstream from culverts on Silver Creek Road, 0.8 mi (1.3 km) southwest of Harvey.

DRAINAGE AREA.--8.58 mi² (22.22 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1962-64. June 1979 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 660 ft (201 m) from topographic map (nearest 10 ft). Aug. 23, 1962, to Nov. 19, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good except those above 20 ft³/s (0.57 m³/s), which are fair. Water quality data for 1980 water year published under "Analyses for samples collected at miscellaneous sites."

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 40 ft³/s (1.13 m³/s) Apr. 9, 1980, gage height, 3.51 ft (1.070 m); minimum observed, 7.0 ft³/s (0.20 m³/s) Nov. 19, 1964, discharge measurement.

EXTREMES FOR CURRENT PERIOD.--June to September 1979: Maximum discharge during period, 36 ft³/s (1.02 m³/s) June 17, gage height, 3.41 ft (1.039 m); minimum, 9.2 ft³/s (0.26 m³/s) on many days; minimum gage height, 2.57 ft (0.783 m) July 8, 11, 12, 15.

Water year 1980: Maximum discharge, 40 ft³/s (1.13 m³/s) Apr. 9, gage height, 3.51 ft (1.070 m); minimum, 8.7 ft³/s (0.25 m³/s) Sept. 28, 29; minimum gage height, 2.56 ft (0.780 m) on many days.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1									9.7	9.4	9.9	9.3
2									9.7	9.4	9.5	9.3
3									9.7	9.4	9.5	9.3
4									9.7	9.4	9.9	9.3
5									9.7	9.4	9.6	9.6
6									9.7	9.4	9.5	9.6
7									9.7	9.4	9.5	9.5
8									9.8	9.4	9.5	9.4
9									11	9.3	9.5	9.3
10									13	9.4	9.5	9.6
11									10	9.3	9.4	10
12									9.8	9.3	9.4	9.5
13									9.7	10	9.5	9.5
14									9.5	9.7	9.4	9.4
15									9.7	9.4	9.4	9.4
16									12	9.4	9.5	9.3
17									21	9.5	9.5	9.3
18									11	9.5	9.4	9.5
19									10	9.6	9.4	9.5
20									10	9.5	9.4	9.4
21									10	9.4	9.3	9.4
22									9.7	9.5	9.3	9.5
23									9.5	9.5	9.5	9.4
24									9.4	11	9.5	9.4
25									9.4	15	9.3	9.4
26									9.5	9.8	9.3	9.5
27									9.5	10	9.3	9.5
28									9.4	9.7	9.3	9.5
29									9.4	9.7	9.6	9.5
30									9.4	17	9.3	9.4
31									---	13	9.5	---
TOTAL	---	---	---	---	---	---	---	---	311.6	312.7	293.4	283.5
MEAN	---	---	---	---	---	---	---	---	10.4	10.1	9.46	9.45
MAX	---	---	---	---	---	---	---	---	23	17	9.9	10
MIN	---	---	---	---	---	---	---	---	9.4	9.3	9.3	9.3
CFSM	---	---	---	---	---	---	---	---	1.21	1.18	1.10	1.10
IN.	---	---	---	---	---	---	---	---	1.35	1.36	1.27	1.23

04044595 SILVER CREEK AT HARVEY, MI--CONTINUED

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	12	9.8	9.8	9.5	9.5	9.9	9.6	9.5	9.5	9.2	9.6
2	9.6	10	9.7	9.9	9.5	9.5	9.9	9.5	9.5	9.3	9.2	9.2
3	9.6	10	9.7	9.8	9.5	9.5	9.9	9.5	9.3	9.3	9.3	9.2
4	9.6	10	9.7	9.7	9.5	9.5	9.9	9.5	9.2	9.3	9.3	9.1
5	9.7	10	9.8	9.8	9.5	9.5	9.9	9.4	9.3	9.5	9.4	9.1
6	9.8	10	9.8	9.8	9.5	9.6	10	9.4	9.3	9.4	9.3	9.1
7	10	10	9.9	9.8	9.5	9.8	13	9.4	9.3	9.5	9.3	9.0
8	9.8	10	9.8	9.8	9.5	10	23	9.5	9.2	9.3	9.3	9.0
9	10	10	9.8	9.8	9.5	10	36	9.5	9.2	9.3	9.3	9.4
10	9.8	10	9.8	9.8	9.5	10	21	9.5	9.2	9.3	9.3	9.1
11	9.8	9.9	9.9	10	9.5	10	14	9.5	9.2	9.3	9.4	9.0
12	10	9.9	9.7	10	9.5	9.9	12	9.4	9.2	9.3	9.3	9.3
13	10	9.9	9.8	10	9.5	9.9	12	9.4	9.8	9.3	9.4	12
14	9.7	10	9.7	10	9.5	9.9	12	9.4	9.9	9.9	9.4	11
15	9.7	10	9.9	10	9.5	9.9	11	9.4	9.5	9.4	9.5	9.3
16	9.6	10	9.8	11	9.5	9.9	11	9.3	9.5	9.4	9.3	9.4
17	9.7	10	9.7	10	9.5	9.9	11	9.4	9.6	9.3	9.2	9.3
18	9.7	10	9.8	10	9.5	9.9	13	9.4	9.5	9.4	9.2	9.6
19	9.8	10	9.8	9.9	9.5	9.9	14	9.4	9.5	9.4	9.2	9.3
20	9.9	9.9	9.8	9.8	9.5	9.9	13	9.3	9.4	10	9.2	9.5
21	10	10	9.8	9.5	9.5	9.9	11	9.3	9.4	9.4	9.0	17
22	14	10	9.8	9.5	9.5	9.9	11	9.2	9.4	9.3	9.0	10
23	20	10	9.8	9.5	9.5	9.9	10	9.2	9.4	9.2	9.0	9.4
24	15	9.9	9.9	9.5	9.5	9.9	10	9.4	9.4	9.2	9.5	9.4
25	11	9.8	9.8	9.5	9.5	9.9	11	9.4	9.4	9.9	9.2	11
26	10	14	9.8	9.5	9.5	9.9	12	9.4	9.3	9.4	9.1	12
27	11	12	9.8	9.5	9.5	9.9	10	9.5	9.4	9.3	9.1	9.7
28	12	10	9.7	9.5	9.5	9.9	9.9	9.4	9.4	9.3	9.1	9.1
29	11	10	9.7	9.5	9.5	9.9	9.9	9.4	9.7	9.2	9.0	8.7
30	10	9.8	9.7	9.5	---	9.9	9.8	9.5	9.4	9.2	9.0	8.8
31	10	---	9.7	9.5	---	9.9	---	11	---	9.2	9.0	---
TOTAL	329.3	307.1	303.2	303.2	275.5	304.9	380.1	293.4	282.3	291.0	286.0	294.6
MEAN	10.6	10.2	9.78	9.78	9.50	9.84	12.7	9.46	9.41	9.39	9.23	9.82
MAX	20	14	9.9	11	9.5	10	36	11	9.9	10	9.5	17
MIN	9.5	9.8	9.7	9.5	9.5	9.5	9.8	9.2	9.2	9.2	9.0	8.7
CFSM	1.24	1.19	1.14	1.14	1.11	1.15	1.48	1.10	1.10	1.09	1.08	1.15
IN.	1.43	1.33	1.31	1.31	1.19	1.32	1.65	1.27	1.22	1.26	1.24	1.28

WTR YR 1980 TOTAL 3650.6 MEAN 9.97 MAX 36 MIN 8.7 CFSM 1.16 IN 15.83

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 46°34'30", long 85°16'10", in NE¼ sec.11, T.48 N., R.8 W., Luce County, Hydrologic Unit 04020202, on left bank 0.7 mi (1.1 km) upstream from Tahquamenon (Big) Falls, 11.5 mi (18.5 km) west of Tahquamenon Paradise, and 19 mi (31 km) northeast of Newberry.

DRAINAGE AREA.--790 mi² (2,046 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1953 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 697 ft (212.4 m) from river-profile map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--27 years, 941 ft³/s (26.65 m³/s), 16.18 in/yr (411 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,990 ft³/s (198 m³/s) May 10, 1960, gage height, 10.26 ft (3.127 m); minimum, 157 ft³/s (4.45 m³/s) July 26, 1955; minimum gage height, 2.86 ft (0.872 m) July 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,260 ft³/s (121 m³/s) Apr. 12, 13, gage height, 8.39 ft (2.557 m); minimum, 217 ft³/s (6.15 m³/s) Sept. 11, gage height, 3.00 ft (0.914 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	427	2780	1940	420	694	405	853	1760	426	584	286	335
2	416	2660	1840	415	649	401	1020	1650	461	579	281	325
3	414	2510	1780	410	608	392	1180	1550	495	565	272	323
4	413	2380	1620	405	569	387	1260	1460	518	526	280	323
5	425	2240	1510	400	538	386	1380	1350	510	476	308	304
6	420	2120	1420	400	508	389	1560	1260	485	452	315	296
7	429	2060	1310	400	478	390	1760	1200	477	436	322	293
8	435	1990	1140	400	451	385	2240	1190	523	402	315	287
9	432	1900	1050	400	429	385	2110	1170	561	400	309	255
10	432	1810	1000	400	412	387	3720	1130	565	376	304	238
11	433	1720	973	400	393	390	4110	1150	550	357	298	231
12	452	1620	943	410	384	392	4230	1210	530	354	299	247
13	486	1520	838	450	377	391	4210	1230	571	341	310	307
14	556	1420	762	500	375	394	4120	1230	894	354	312	374
15	584	1320	735	600	375	391	3910	1200	1160	366	322	438
16	606	1220	720	680	375	392	3770	1150	1340	388	329	457
17	595	1140	700	767	381	396	3600	1080	1470	385	328	455
18	596	1080	687	930	383	404	3410	980	1480	398	312	452
19	615	1060	660	1020	380	415	3240	898	1470	391	307	459
20	736	1070	632	1080	378	439	3140	822	1420	393	302	466
21	898	1100	600	1110	380	471	3020	732	1360	393	299	519
22	1150	1170	570	1130	386	494	2900	669	1260	388	287	634
23	1640	1270	550	1120	392	516	2720	607	1150	379	292	700
24	2210	1340	540	1100	396	527	2630	548	1040	372	285	740
25	2650	1380	520	1060	399	532	2510	504	905	343	293	750
26	2890	1480	500	1010	407	536	2370	469	772	333	292	784
27	2980	1750	490	956	404	550	2220	440	690	329	303	804
28	3020	1890	470	904	399	560	2090	415	621	325	319	804
29	3000	1990	450	855	403	589	1980	397	600	309	336	793
30	2940	2020	440	802	---	644	1870	383	589	307	346	744
31	2830	---	430	749	---	727	---	381	---	297	336	---
TOTAL	36110	51010	27840	21683	12703	14057	79133	30215	24893	12298	9499	14137
MEAN	1165	1700	898	699	438	453	2638	975	830	397	306	471
MAX	3020	2780	1940	1130	694	727	4230	1760	1480	584	346	804
MIN	413	1060	430	400	375	385	853	381	426	297	272	231
CFSM	1.48	2.15	1.14	.89	.55	.57	3.34	1.23	1.05	.50	.39	.60
IN.	1.70	2.40	1.31	1.02	.60	.66	3.73	1.42	1.17	.58	.45	.67

CAL YR 1979 TOTAL 454513 MEAN 1245 MAX 5490 MIN 376 CFSM 1.58 IN 21.40
WTR YR 1980 TOTAL 333578 MEAN 911 MAX 4230 MIN 231 CFSM 1.15 IN 15.71

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1967, 1973 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--In addition to water-quality monitor, samples are collected periodically by a local observer. Monthly samples are collected as a cross-section sample at cableway 40 ft (12 m) downstream from gage or by wading 300 ft (91 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and were analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1976-80), 238 micromhos Jan. 24, 1977; minimum (water years 1976, 1978-80), 34 micromhos Apr. 17, 18, 1976.
WATER TEMPERATURES (water years 1976-80): Maximum, 26.5°C May 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 214 micromhos Sept. 17; minimum, 43 micromhos Nov. 30.
WATER TEMPERATURES: Maximum, 24.5°C Aug. 8; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)
OCT											
23...	1415	1670	114	7.2	10.5	8.1	75	--	37	110	50
NOV											
27...	1230	1780	73	6.9	3.0	10.4	79	--	K9	47	39
DEC											
17...	1200	692	116	6.8	.0	8.8	59	--	K2	K220	60
JAN											
16...	1445	648	130	6.9	.0	7.4	52	--	K6	K8	75
FEB											
05...	1230	525	136	7.1	.0	6.7	47	--	K2	K1200	67
MAR											
03...	1200	392	160	7.2	.0	9.4	67	96	K2	<1	82
APR											
08...	1130	2020	76	7.2	1.0	10.6	76	270	K1	K7	36
MAY											
14...	1200	1190	100	7.3	11.0	9.4	85	38	K7	K3	50
JUN											
09...	1230	552	165	7.7	16.0	8.7	89	24	26	K9	76
JUL											
09...	1130	381	150	7.6	20.5	7.6	87	25	--	--	77
AUG											
06...	1400	296	184	7.9	23.0	8.2	98	7	22	25	94
SEP											
09...	1145	255	198	8.0	19.0	7.6	83	24	--	--	90

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)
OCT											
23...	8	14	3.7	0	1.3	7	.1	1.0	51	0	42
NOV											
27...	10	11	2.8	0	1.1	8	.1	.7	35	0	29
DEC											
17...	11	17	4.3	--	1.6	7	.1	.8	60	0	49
JAN											
16...	5	21	5.5	0	1.8	5	.1	.7	86	0	71
FEB											
05...	11	19	4.8	0	1.3	4	.1	.8	68	0	56
MAR											
03...	2	23	6.0	--	1.8	5	.1	.8	98	0	80
APR											
08...	4	9.8	2.7	--	1.1	6	.1	.7	39	0	32
MAY											
14...	12	14	3.6	0	1.4	6	.1	.6	53	0	43
JUN											
09...	14	21	5.8	0	2.1	6	.1	.6	87	0	71
JUL											
09...	12	21	5.9	--	1.9	5	.1	.5	88	0	72
AUG											
06...	11	26	7.0	0	2.0	4	.1	.6	110	0	83
SEP											
09...	0	21	9.1	0	2.1	5	.1	.8	110	0	90

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT										
23...	5.1	8.9	2.6	.1	6.3	110	64	496	12	108
NOV										
27...	7.1	7.3	1.6	.0	6.0	76	48	365	3	90
DEC										
17...	15	9.1	1.8	.0	7.4	103	72	192	4	101
JAN										
16...	17	12	1.8	.1	9.2	[illegible]	96	171	11	105
FEB										
05...	8.6	12	1.8	.1	9.1	104	81	147	6	108
MAR										
03...	9.9	11	1.6	.1	9.4	107	103	113	4	130
APR										
08...	3.9	6.5	1.4	.0	5.5	65	47	355	0	69
MAY										
14...	3.7	10	1.7	.0	3.1	86	58	276	7	93
JUN										
09...	2.4	13	1.7	.1	5.1	105	87	157	12	116
JUL										
09...	3.2	7.7	1.5	.1	5.2	101	83	104	2	107
AUG										
06...	2.0	7.2	1.6	.1	5.8	122	100	97.5	7	117
SEP										
09...	1.8	8.9	1.6	.1	8.5	128	107	88.1	6	133

DATE	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)
OCT										
23...	.09	.09	.070	.000	.08	.47	.54	.63	2.8	.030
NOV										
27...	--	.09	.010	.010	.01	.44	.45	.53	2.3	.020
DEC										
17...	.14	.11	.070	.060	.08	.41	.48	.62	2.7	--
JAN										
16...	--	.23	--	.080	.06	.40	.45	.66	2.9	.020
FEB										
05...	--	.13	.060	.060	.07	.39	.45	.57	2.5	.030
MAR										
03...	--	.17	--	.050	.05	.22	.26	.41	1.8	.020
APR										
08...	--	.14	.020	.000	.02	.37	.39	.52	2.3	.020
MAY										
14...	--	.04	.050	.020	.06	.43	.48	.51	2.3	.020
JUN										
09...	--	.05	.100	.040	.12	.60	.70	.74	3.3	.020
JUL										
09...	--	.04	.020	.000	.02	.50	.52	.55	2.4	.020
AUG										
06...	--	.02	.050	.010	.06	.25	.30	.31	1.4	.030
SEP										
09...	.03	.02	.030	.010	.04	--	--	--	--	--

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOS- PHORUS, TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTO- PLANK- TON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 23...	.09	.020	.010	.03	.000	.000	--	4	18	100
NOV 27...	.06	.010	.000	.00	.000	.000	17	1	4.8	100
DEC 17...	--	.010	.000	.00	.000	.000	6.6	--	--	--
JAN 16...	.06	.010	.010	.03	--	--	--	4	7.0	100
FEB 05...	.09	.010	.010	.03	.000	.000	6.9	--	--	--
MAR 03...	.06	.010	.090	.28	.000	.000	5.2	1	1.1	100
APR 08...	.06	.010	.000	.00	.000	.000	9.7	7	38	100
MAY 14...	.06	.010	.000	.00	1.79	.000	--	5	16	100
JUN 09...	.06	.020	.000	.00	3.16	.020	8.6	5	7.5	100
JUL 09...	.06	.010	.000	.00	--	--	11	7	7.2	100
AUG 06...	.09	.010	.000	.00	5.85	1.97	2.4	6	4.8	100
SEP 09...	.00	.010	.000	.00	4.82	.000	--	2	1.4	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)
OCT 23...	1415	1	1	<50	40	--	2	10	<10	--	0	--
JAN 16...	1445	0	0	100	20	--	1	20	<10	0	0	3
MAY 14...	1200	--	2	<50	20	0	0	10	10	0	0	2
SEP 09...	1145	--	0	--	100	0	0	--	10	0	0	3

DATE	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	LITHIUM TOTAL RECOV- ERABLE (UG/L AS LI)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)	MERCURY DIS- SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI)
OCT 23...	2	830	480	--	1	--	50	20	.4	.2	--
JAN 16...	3	640	390	3	0	--	50	50	<.1	<.1	3
MAY 14...	2	540	290	0	0	--	20	10	.2	<.1	5
SEP 09...	4	460	160	--	3	0	30	10	--	.2	4

DATE	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	TI- TANIUM, DIS- SOLVED (UG/L AS TI)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT 23...	0	0	0	0	--	110	30	19	.5	--	--
JAN 16...	0	0	0	0	--	20	10	7.8	.5	--	--
MAY 14...	0	0	0	0	--	--	20	15	--	--	--
SEP 09...	0	--	0	0	<5	20	10	.1	.5	.00	0

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)
NOV											
27...	1230	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR, TOTAL (UG/L)
NOV											
27...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALATHION, TOTAL (UG/L)	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG)
NOV											
27...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHYL TRITHION, TOTAL (UG/L)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG)	PARATHION, TOTAL (UG/L)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV											
27...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
NOV							
27...	1230	35	--	.000	.000	.000	.000
FEB							
05...	1230	20	--	.160	.160	.000	.000
JUL							
09...	1130	30	778	3.23	3.86	.810	.230

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 7,78	MAR 27,79	MAY 22,79	JUN 26,79	JUL 24,79
TIME	1430	1230	1130	1245	1400
TOTAL CELLS/ML	330	50	90	700	950
DIVERSITY: DIVISION	0.4	1.2	0.0	0.3	1.2
.CLASS	0.4	1.2	0.0	0.3	1.2
..ORDER	0.4	2.0	0.9	0.4	1.3
...FAMILY	0.5	2.6	1.1	0.5	1.3
....GENUS	0.5	2.9	1.1	0.5	1.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	5	10	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	5	10	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	10#	20	--	-	--	-	90	9
....STEPHANODISCUS	--	-	--	-	64#	71	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	5	10	--	-	--	-	--	-
....COCCONEIS	--	-	10#	20	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	14	4	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	13	14	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	13	2	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	14	4	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	5	10	13	14	26	4	13	1
...SURIRELLACEAE										
....SURIRELLA	--	-	5	10	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
....STENOCALYX	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	210#	22

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 7,78 1430		MAR 27,79 1230		MAY 22,79 1130		JUN 26,79 1245		JUL 24,79 1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	13	2	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	640#	68
...OSCILLATORIACEAE										
....OSCILLATORIA	310#	92	--	-	--	-	640#	93	--	-
....SPIRULINA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	5	10	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 22,79 1300	SEP 18,79 1345	NOV 27,79 1230	MAR 3,80 1200	MAY 14,80 1200
TOTAL CELLS/ML	39	43	340	560	1600
DIVERSITY: DIVISION	0.9	0.9	0.9	0.8	1.1
.CLASS	0.9	0.9	0.9	0.8	1.5
..ORDER	1.6	0.9	1.2	1.0	2.1
...FAMILY	1.6	0.9	1.6	1.1	2.3
....GENUS	1.6	0.9	1.7	1.3	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	3	1	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	14	1
...OOCYSTACEAE										
....ANKISTRODESMUS	13#	33	--	-	3	1	10	2	--	-
....CHLORELLA	--	-	--	-	220#	65	15	3	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	7	2	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	29#	67	--	-	--	-	43	3
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13#	33	--	-	72#	21	30	5	730#	45
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	3	1	15	3	--	-
....COCCONEIS	--	-	--	-	3	1	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	5	1	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	7	2	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	57	4
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	7	2	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	3	1	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	3	1	15	3	--	-
...NITZSCHIACEAE										
....NITZSCHIA	13#	33	--	-	7	2	--	-	43	3
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	100	6
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
....STENOCALYX	--	-	--	-	--	-	--	-	57	4
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 22,79		SEP 18,79		NOV 27,79		MAR 3,80		MAY 14,80	
TIME	1300		1345		1230		1200		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	430#	26
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	450#	80	--	-
....SPIRULINA	--	-	--	-	--	-	15	3	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	160	10
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	14#	33	--	-	5	1	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA. WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980

IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 9.80 1230	JUL 9.80 1130	AUG 6.80 1400	SEP 9.80 1145
TOTAL CELLS/ML	260	530	2000	2600
DIVERSITY: DIVISION	1.4	1.4	1.5	1.8
.CLASS	1.8	1.4	1.6	1.8
..ORDER	2.1	2.4	1.8	2.1
...FAMILY	2.1	2.6	2.2	2.4
....GENUS	2.1	2.6	2.3	2.5

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	33	2	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	67	3	130	5
...OOCYSTACEAE								
....ANKISTRODESMUS	52#	20	--	-	84	4	51	2
....CHLORELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	180	9	--	-
....SELENASTRUM	--	-	--	-	--	-	*	0
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	150	6
....SCENEDESMUS	--	-	77	15	130	7	51	2
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	26	1
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	190#	37	--	-	100	4
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	26	5	17	1	51	2
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	100#	40	77	15	1200#	57	640#	25
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	17	1	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	51	10	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	26	10	13	2	17	1	*	0
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--		--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-
...MALLOMONADACEAE								
....MALLOMONAS	--	-	--	-	33	2	--	-
...OCHROMONADACEAE								
....OCHROMONAS	26	10	--	-	--	-	--	-
....STENOCALYX	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	26	5	200	10	140	5
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	64	12	17	1	39	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 9,80 1230		JUL 9,80 1130		AUG 6,80 1400		SEP 9,80 1145	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	52#	20	--	-	33	2	1200#	45
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
....SPIRULINA	--	-	--	-	--	-	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	33	2	*	0
....TRACHELOMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04045500 TAHQUAMFNON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBFR			NOVEMBER			DECEMBER			JANUARY	
1	151	147	149	70	68	69	60	50	55	106	91	100
2	151	149	150	72	69	71	53	49	52	106	91	96
3	153	150	152	75	72	74	54	49	52	111	96	103
4	155	153	154	79	74	76	71	51	61	131	105	116
5	158	154	156	79	74	78	77	68	72	139	113	127
6	161	156	159	79	75	77	81	72	77	131	114	122
7	162	161	161	79	77	78	78	74	77	138	118	129
8	167	162	163	80	78	79	80	76	79	150	127	140
9	169	164	167	81	74	77	91	75	85	150	131	143
10	180	169	175	78	74	76	93	88	91	149	129	137
11	179	172	175	84	75	78	97	86	92	152	129	144
12	178	173	175	87	75	78	100	87	95	150	138	143
13	179	173	177	90	83	86	120	98	109	143	130	135
14	175	169	172	96	85	90	115	105	110	---	---	---
15	172	169	170	98	92	95	---	---	---	---	---	---
16	172	167	170	98	90	94	---	---	---	137	123	---
17	173	166	169	101	91	96	126	116	---	136	120	---
18	174	167	171	103	91	97	130	116	121	105	94	---
19	173	159	168	101	86	93	129	117	123	101	93	96
20	164	158	161	102	89	95	131	122	127	101	91	95
21	159	140	149	98	87	92	132	121	127	95	81	91
22	141	116	131	93	84	87	134	111	125	92	79	88
23	119	96	108	86	77	81	130	117	122	108	87	---
24	94	83	88	77	73	75	129	118	123	108	97	103
25	84	82	83	75	72	74	127	114	124	101	95	98
26	85	81	83	73	65	69	120	108	114	97	92	95
27	83	78	80	64	56	60	117	107	112	98	94	96
28	78	75	76	56	50	52	116	98	107	105	98	103
29	74	73	74	54	45	47	115	97	110	107	99	103
30	76	70	73	55	43	47	115	108	112	115	107	111
31	71	69	70	---	---	---	113	96	107	119	107	116
MONTH	180	69	139	103	43	78						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEHRUARY			MARCH			APRIL			MAY	
1	122	110	116	168	145	160	---	---	---	71	65	68
2	---	110	---	163	146	155	---	---	---	77	72	74
3	---	113	---	153	139	146	---	---	---	82	78	80
4	---	118	---	149	146	148	---	---	---	88	82	86
5	128	119	---	150	148	149	---	---	---	93	79	89
6	127	124	126	155	147	151	---	---	---	90	79	80
7	129	126	128	151	142	147	---	---	---	104	80	96
8	131	128	129	157	135	145	---	81	---	101	101	101
9	134	131	132	146	134	140	81	58	69	103	103	103
10	136	133	135	150	144	147	58	44	48	105	102	105
11	139	135	137	150	134	143	52	46	50	108	106	107
12	141	138	139	149	135	143	53	50	52	109	109	109
13	144	140	142	160	141	149	52	48	50	112	112	112
14	146	143	144	159	136	150	50	49	49	114	---	---
15	149	142	146	158	146	153	52	51	51	---	---	---
16	153	141	148	154	141	148	53	52	52	---	---	---
17	152	150	151	151	140	147	59	54	56	---	---	---
18	154	147	152	151	135	144	57	51	55	---	---	---
19	155	146	150	152	135	143	52	51	51	---	---	---
20	165	143	153	147	125	140	52	50	51	---	---	---
21	164	150	161	135	---	---	53	52	53	---	---	---
22	163	154	160	---	---	---	58	54	55	---	---	---
23	162	147	153	---	---	---	61	60	60	---	---	---
24	155	145	150	---	---	---	61	58	59	---	---	---
25	156	147	151	---	---	---	60	57	58	---	---	---
26	156	148	153	---	---	---	58	56	57	---	---	---
27	159	151	156	---	---	---	58	58	58	---	---	---
28	164	153	158	---	---	---	60	58	59	---	---	---
29	168	155	162	---	---	---	60	59	59	---	---	---
30	---	---	---	---	---	---	65	61	62	---	---	---
31	---	---	---	---	---	---	---	---	---	---	---	---
MONTH		110										

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	140	134	137	190	188	189	202	200	201
2	---	---	---	139	136	138	190	188	189	205	202	203
3	---	---	---	140	137	138	192	189	191	208	203	205
4	---	---	---	144	139	142	193	191	192	209	207	208
5	---	---	---	150	143	146	192	189	190	211	204	208
6	---	---	---	150	147	148	200	190	194	205	199	201
7	---	---	---	151	148	149	190	187	188	200	199	199
8	---	---	---	153	148	150	191	187	188	200	198	199
9	167	164	---	156	152	153	190	185	188	199	197	198
10	165	160	162	158	154	155	187	184	186	200	197	198
11	164	159	160	159	155	157	189	187	188	201	199	200
12	167	158	162	164	159	161	192	188	190	201	200	201
13	166	156	163	167	164	165	196	192	193	201	199	200
14	154	140	147	169	164	167	199	195	197	200	198	199
15	139	121	129	170	164	167	198	192	194	198	195	196
16	120	116	118	170	168	169	192	189	191	206	197	200
17	119	114	115	174	170	171	192	191	191	214	207	213
18	113	112	112	174	173	174	192	189	190	213	196	205
19	111	110	110	176	173	174	191	188	189	196	194	195
20	110	108	109	176	174	175	193	191	192	198	195	197
21	111	109	110	180	175	177	200	193	195	198	183	190
22	115	110	112	184	180	181	204	196	200	182	175	178
23	119	114	116	187	183	185	203	196	198	176	170	174
24	121	118	119	187	185	186	201	196	198	170	159	163
25	124	120	122	187	184	185	200	193	196	161	157	159
26	127	123	125	187	185	186	196	193	194	165	160	163
27	132	126	128	188	186	186	203	196	198	160	150	154
28	133	130	131	190	188	189	198	194	196	151	143	146
29	135	132	132	191	189	190	197	195	196	145	140	141
30	135	134	134	191	189	190	202	196	199	144	141	143
31	---	---	---	190	188	190	203	199	201	---	---	---
MONTH				191	134	167	204	184	193	214	140	188

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	14.5	14.0	14.5	7.5	5.0	6.5	---	.0	---	.0	.0	.0
2	15.0	14.0	14.5	7.5	5.5	6.5	---	.0	---	.0	.0	.0
3	14.5	14.0	14.0	7.0	5.0	6.5	---	.0	---	.0	.0	.0
4	14.5	13.5	14.0	5.0	4.5	4.5	---	.0	---	.0	.0	.0
5	14.0	13.0	13.5	5.0	4.0	4.5	---	.0	---	.0	.0	.0
6	13.5	12.5	13.0	5.0	4.0	4.5	---	.0	---	.0	.0	.0
7	12.5	11.5	12.0	4.5	3.5	4.0	---	.0	---	.0	.0	.0
8	11.0	10.5	11.0	3.5	2.5	3.0	---	.0	---	.0	.0	.0
9	10.0	9.0	9.5	2.5	1.0	2.0	---	.0	---	.0	.0	.0
10	9.5	8.0	9.0	1.5	.5	1.0	---	.0	---	.0	.0	.0
11	8.5	8.0	8.5	.5	.0	.0	---	.0	---	.0	.0	.0
12	8.5	7.5	8.0	.0	.0	.0	---	.0	---	.0	.0	.0
13	7.5	7.0	7.5	.5	.0	.0	---	.0	---	.0	.0	.0
14	7.0	6.5	6.5	.5	.0	.5	---	.0	---	.0	.0	.0
15	7.0	5.5	6.5	.5	.0	.0	---	.0	---	.0	.0	.0
16	6.5	5.5	6.0	.5	.0	.0	---	.0	---	.0	.0	.0
17	7.0	6.0	6.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
18	6.5	5.5	6.0	1.5	.0	.5	.0	.0	.0	.0	.0	.0
19	7.5	6.5	7.0	1.5	.5	1.0	.0	.0	.0	.0	.0	.0
20	8.5	7.5	8.0	3.0	1.0	2.0	.0	.0	.0	.0	.0	.0
21	10.0	8.5	9.5	4.0	1.0	2.5	.0	.0	.0	.0	.0	.0
22	10.5	9.0	10.0	4.5	2.0	3.0	.0	.0	.0	.0	.0	.0
23	12.0	9.0	10.5	4.0	2.5	3.0	.0	.0	.0	.0	.0	.0
24	10.5	7.5	8.5	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
25	9.0	7.0	7.5	5.0	2.0	3.5	.0	.0	.0	.0	.0	.0
26	6.5	4.5	5.5	6.0	3.0	5.0	.0	.0	.0	.0	.0	.0
27	4.5	2.5	3.5	6.0	1.5	2.5	.0	.0	.0	.0	.0	.0
28	4.5	2.5	3.5	5.5	1.0	3.0	.0	.0	.0	.0	.0	.0
29	4.0	2.0	3.0	3.5	.5	1.5	.0	.0	.0	.0	.0	.0
30	4.5	2.5	3.0	3.0	.0	1.5	.0	.0	.0	.0	.0	.0
31	5.5	3.5	4.0	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	15.0	2.0	8.5	7.5	.0	2.5				.0	.0	.0

04045500 TAHQUAMENON RIVER NEAR TAHQUAMENON PARADISE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0						
2	.0	.0	.0	.0	.0	.0						
3	.0	.0	.0	.0	.0	.0						
4	.0	.0	.0	.0	.0	.0						
5	.0	.0	.0	.0	.0	.0						
6	.0	.0	.0	.0	.0	.0						
7	.0	.0	.0	.0	.0	.0						
8	.0	.0	.0	.0	.0	.0						
9	.0	.0	.0	.0	.0	.0						
10	.0	.0	.0	.0	.0	.0						
11	.0	.0	.0	.0	.0	.0						
12	.0	.0	.0	.0	.0	.0						
13	.0	.0	.0	.0	.0	.0						
14	.0	.0	.0	.0	.0	.0						
15	.0	.0	.0	.0	.0	.0						
16	.0	.0	.0	.0	.0	.0						
17	.0	.0	.0	.0	.0	.0						
18	.0	.0	.0	.0	.0	.0						
19	.0	.0	.0	.0	.0	.0						
20	.0	.0	.0	.0	.0	.0						
21	.0	.0	.0	---	.0	---						
22	.0	.0	.0	---	.0	---						
23	.0	.0	.0	---	.0	---						
24	.0	.0	.0	---	.0	---						
25	.0	.0	.0	---	.0	---						
26	.0	.0	.0	---	.0	---						
27	.0	.0	.0	---	.0	---						
28	.0	.0	.0	---	.0	---						
29	.0	.0	.0	---	.0	---						
30	---	---	---	---	.0	---						
31	---	---	---	---	.0	---						
MONTH	.0	.0	.0		.0							

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	19.5	18.5	19.0	23.5	21.5	22.5	21.0	20.5	20.5
2	---	---	---	18.5	17.5	18.0	23.5	22.0	22.5	21.0	20.0	20.5
3	---	---	---	19.0	17.5	18.0	23.5	21.5	22.5	20.0	19.5	19.5
4	---	---	---	19.5	18.0	18.5	22.0	21.5	22.0	20.0	19.5	19.5
5	---	---	---	20.0	18.5	19.0	23.0	21.5	22.0	20.0	19.0	19.5
6	---	---	---	20.0	18.5	19.0	23.5	22.0	22.5	20.5	19.0	19.5
7	---	---	---	20.0	18.5	19.5	24.0	22.5	23.0	20.5	19.0	19.0
8	---	---	---	21.5	19.5	20.5	24.5	23.5	24.0	20.0	18.5	19.5
9	16.0	---	---	21.5	19.5	20.5	24.0	23.0	23.5	19.5	18.5	19.0
10	15.5	15.0	15.5	21.5	20.0	21.0	23.0	22.5	23.0	19.0	18.5	18.5
11	16.0	14.5	15.0	22.0	21.0	21.5	23.0	22.5	22.5	19.0	18.0	18.5
12	15.5	15.0	15.0	21.5	20.5	21.0	23.0	22.0	22.5	17.5	17.0	17.5
13	15.5	15.5	15.5	22.5	21.0	21.5	22.0	21.5	22.0	17.0	16.5	17.0
14	15.5	15.0	15.5	22.5	22.0	22.0	22.5	21.0	21.5	16.5	15.5	16.0
15	16.0	15.0	15.5	23.5	22.0	22.5	22.0	20.5	21.0	16.0	15.0	15.5
16	16.0	15.0	15.5	23.0	22.5	22.5	21.0	20.0	20.5	15.5	15.0	15.5
17	16.5	15.5	16.0	23.5	22.0	22.5	20.5	20.0	20.0	15.0	14.0	14.5
18	17.0	16.0	16.5	22.5	22.0	22.0	20.5	19.5	20.0	14.0	13.5	14.0
19	17.0	16.5	16.5	23.0	21.5	22.0	20.5	19.5	20.0	13.5	13.0	13.5
20	17.5	16.0	17.0	23.0	22.0	22.5	21.0	20.0	20.5	13.5	13.0	13.0
21	17.5	16.5	17.0	23.5	22.0	22.5	21.5	20.5	21.0	12.5	12.5	12.5
22	18.5	17.5	18.0	23.5	22.5	22.5	22.0	20.5	21.5	12.5	12.0	12.5
23	19.5	18.5	19.0	24.0	22.0	22.5	22.5	20.5	21.5	12.0	11.0	11.5
24	21.0	19.5	20.0	23.0	22.0	22.5	22.0	21.0	21.5	11.0	10.5	11.0
25	22.5	21.0	21.5	22.5	22.0	22.5	22.0	21.0	21.5	11.0	10.5	11.0
26	23.5	22.0	22.5	22.5	21.5	22.0	22.0	21.5	21.5	10.5	10.0	10.5
27	23.0	22.0	22.5	22.0	21.0	21.5	22.0	21.0	21.5	10.0	9.5	10.0
28	22.0	21.0	21.5	23.0	21.0	22.0	21.5	20.5	21.0	9.5	9.0	9.0
29	21.0	20.0	20.5	23.0	21.5	22.5	21.5	21.0	21.0	10.0	9.0	9.5
30	20.0	19.0	19.5	23.0	21.5	22.0	21.5	21.0	21.0	10.5	10.0	10.5
31	---	---	---	22.5	21.5	22.0	21.0	20.5	20.5	---	---	---
MONTH				24.0	17.5	21.0	24.5	19.5	21.5	21.0	9.0	15.5

04045580 ST. MARYS RIVER ABOVE SAULT STE. MARIE, MI
(National stream-quality accounting network and radiochemical station)

LOCATION.--Lat 46°29'29", long 82°25'17", in NW¼ sec.10, T.47 N., R.1 W., Chippewa County, Hydrologic Unit 04020300, at Sault Ste. Marie municipal raw-water intake at Big Point, 1 mi (1.6 km) west of Sault Ste. Marie.

DRAINAGE AREA.--80,900 mi² (210,000 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: March 1974 to current year.
WATER TEMPERATURES: March 1974 to current year.

REMARKS.--Daily obse[illegible] samples and most monthly samples were collected at the raw-water tap in Sault Ste. Marie municipal water plant at Big Point. Intake is 1,500 ft (457 m) out at a depth of 30 ft (9 m), 10 ft (3 m) above bottom of the channel. The October sample was collected by boat as a cross-section sample at Brush Point 2.2 mi (3.5 km) upstream. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

COOPERATION.--Once daily temperature and specific conductance records are collected by Sault Ste. Marie municipal treatment facility employees. Discharge records furnished by U.S. Army Corps of Engineers, Sault Ste. Marie.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 105 micromhos Nov. 11, 1978; minimum daily, 76 micromhos Apr. 24, 1975.
WATER TEMPERATURES: Maximum daily, 24.0°C July 25, 1979; minimum daily, 0.0°C Mar. 14, 15, 1974, Feb. 1, 1979.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 100 micromhos, Aug. 9, 30; minimum observed, 87 micromhos Oct. 7-9, Nov. 10, 11, 17, 18, 28, Dec. 18.
WATER TEMPERATURES: Maximum daily, 22.0°C Aug. 8; minimum daily, 2.0°C Jan. 12, 14.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 24...	1100	97000	96	7.7	10.0	10.4	94	K2	<1	43	0	13
NOV 28...	0850	91900	87	7.6	4.0	12.8	94	K1	K4	43	0	13
DEC 18...	0930	81300	87	7.4	3.0	13.6	92	<1	<1	43	0	13
JAN 17...	0930	74700	92	7.5	3.5	13.8	96	<1	<1	46	1	14
FEB 06...	0845	75400	90	7.2	3.0	13.2	92	<1	<1	43	0	13
MAR 04...	0845	74500	90	7.2	3.5	13.6	95	<1	<1	43	0	13
APR 09...	0830	75700	96	7.7	4.0	13.1	92	K2	K2	41	0	12
MAY 15...	0900	84800	91	7.4	8.5	11.3	99	K2	K1	44	5	13
JUN 10...	0900	80300	96	7.7	9.0	12.1	101	--	K1	44	8	13
JUL 10...	0910	77200	93	7.6	17.0	10.5	109	<1	K1	44	3	13
AUG 07...	0830	74500	92	7.5	20.5	8.8	99	K2	K3	44	4	13
SEP 10...	0930	72000	96	8.0	18.0	10.0	96	K3	K6	43	0	13

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 24...	2.6	0	1.2	.1	7	.6	54	0	44	1.7	3.4
NOV 28...	2.5	0	1.2	.1	7	.5	52	0	43	2.1	2.0
DEC 18...	2.5	--	1.3	.1	8	.6	55	0	45	3.5	3.7
JAN 17...	2.7	0	1.3	.1	7	.5	55	0	45	2.8	2.6
FEB 06...	2.5	0	1.3	.1	6	.5	54	0	44	5.5	3.4
MAR 04...	2.6	--	1.3	.1	6	.5	55	0	45	5.6	2.8
APR 09...	2.6	0	1.3	.1	6	.5	55	0	45	1.8	2.7
MAY 15...	2.7	0	1.3	.1	6	.4	58	0	48	3.0	4.5
JUN 10...	2.7	--	1.4	.1	6	.5	54	0	44	1.4	2.8
JUL 10...	2.8	0	1.4	.1	6	.5	54	0	44	2.0	2.2
AUG 07...	2.7	0	1.3	.1	6	.5	54	0	40	2.5	1.6
SEP 10...	2.6	--	1.5	.1	7	.5	57	0	44	.9	2.6

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
24...	1.6	.1	2.1	68	52	17800	.27	.26	.050	.000	.06
NOV											
28...	1.1	.0	2.3	52	49	12900	.29	.25	.010	.000	.01
DEC											
18...	1.2	.0	2.3	56	53	12300	.30	.28	.010	.010	.01
JAN											
17...	1.3	.0	2.5	52	54	10500	--	.31	.120	.000	.15
FEB											
06...	1.0	.1	2.3	53	52	10800	.22	.22	.010	.010	.01
MAR											
04...	1.3	.0	2.3	73	53	14700	--	.36	.000	.000	.00
APR											
09...	1.4	.0	2.3	54	51	11000	.30	.30	.000	.000	.00
MAY											
15...	1.3	.0	2.3	56	50	12800	.26	.26	.040	.010	.05
JUN											
10...	1.2	.0	2.4	88	47	19100	.27	.27	.030	.000	.04
JUL											
10...	1.2	.1	2.1	64	48	13300	.23	.04	.000	.000	.00
AUG											
07...	1.1	.1	2.1	60	48	12100	.24	.24	.020	.000	.02
SEP											
10...	1.2	.0	2.3	75	51	14600	.28	.27	.010	.000	.01

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
24...	.08	.13	.40	1.8	.010	.03	.000	--	2	524	100
NOV											
28...	.18	.19	.48	2.1	.010	.03	.000	6.9	--	--	--
DEC											
18...	.17	.18	.48	2.1	--	--	.000	1.0	--	--	--
JAN											
17...	.21	.33	.62	2.7	.000	.00	.000	--	--	--	--
FEB											
06...	.04	.05	.27	1.2	.010	.03	.010	12	--	--	--
MAR											
04...	.13	.13	.48	2.1	.010	.03	.000	2.2	--	--	--
APR											
09...	.08	.08	.38	1.7	.010	.03	.000	--	--	--	--
MAY											
15...	.21	.25	.51	2.3	.010	.03	.010	3.2	--	--	--
JUN											
10...	.13	.16	.43	1.9	.000	.00	.000	.3	--	--	--
JUL											
10...	.04	.04	.27	1.2	.010	.03	.000	--	--	--	--
AUG											
07...	.00	.00	.24	1.1	.000	.00	.000	2.7	--	--	--
SEP											
10...	.11	.12	.40	1.8	.010	.03	.000	4.7	--	--	--

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT										
24...	1100	2	2	--	20	--	1	20	10	--
JAN										
17...	0930	1	0	100	20	0	0	30	10	--
APR										
09...	0830	1	1	100	30	--	5	30	20	0
JUL										
10...	0910	0	0	<50	20	0	0	20	<10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT										
24...	0	--	2	30	10	--	0	10	1	.2
JAN										
17...	1	6	4	60	10	2	0	10	0	<.1
APR										
09...	0	5	4	70	20	1	1	--	1	.1
JUL										
10...	0	4	3	80	10	2	0	10	1	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT										
24...	<.1	--	0	0	0	0	20	3	2.5	.1
JAN										
17...	<.1	3	0	0	0	0	210	140	3.9	.2
APR										
09...	.1	--	0	0	0	0	--	100	2.0	.0
JUL										
10...	<.1	0	0	0	0	0	70	60	3.7	.2

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

RADIOCHEMICAL ANALYSES

DATE	TIME	GROSS ALPHA, DIS-SOLVED (UG/L AS U-NAT)	GROSS ALPHA, SUSP. TOTAL (UG/L AS U-NAT)	GROSS BETA, DIS-SOLVED (PCI/L AS CS-137)	GROSS BETA, SUSP. TOTAL (PCI/L AS CS-137)	GROSS BETA, DIS-SOLVED (PCI/L AS SR/YT-90)	GROSS BETA, SUSP. TOTAL (PCI/L AS SR/YT-90)	RADIUM 226, DIS-SOLVED, RADON METHOD (PCI/L)	URANIUM DIS-SOLVED, EXTRAC-TION (UG/L)
OCT									
24...	1100	<.7	<.4	1.9	<.4	1.8	<.4	.10	.02
MAY									
15...	0900	.4	<.4	1.2	<.4	1.1	<.4	.05	.08

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV							
28...	0850	35	.00	.080	.080	.090	.000
AUG							
07...	0830	28	527	.236	.315	.150	.040

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 8,78	MAR 28,79	MAY 23,79	JUN 27,79	JUL 25,79
TIME	1300	1330	1200	1145	1100
TOTAL CELLS/ML	220	150	1300	64	26
DIVERSITY: DIVISION	0.7	1.2	0.5	1.5	0.0
.CLASS	0.7	1.2	0.5	1.5	0.0
..ORDER	0.7	1.6	0.6	1.9	1.0
...FAMILY	0.9	2.2	0.6	1.9	1.0
....GENUS	0.9	2.3	0.6	1.9	1.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /MI	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	14	7	--	-	--	-	13#	20	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	71#	48	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	29	13	20	14	77	6	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....FLAKATOTHRIX	--	-	--	-	26	2	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	5	3	--	-	13#	20	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	20	14	--	-	--	-	13#	50
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	5	3	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	5	3	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	--	-	13#	50
...NITZSCHIACEAE										
....NITZSCHIA	--	-	5	3	26	2	13#	20	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	15	10	--	-	--	-	--	-
....COCCOCHLORIS	170#	80	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	1200#	90	26#	40	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 23,79	SEP 19,79	NOV 28,79	MAR 4,80	MAY 15,80
TIME	1015	1020	0850	0845	0900
TOTAL CELLS/ML	120	870	120	1700	400
DIVERSITY: DIVISION	0.8	0.7	0.5	0.6	1.4
.CLASS	0.8	0.7	0.5	0.6	1.4
..ORDER	0.8	0.8	1.0	0.6	2.1
...FAMILY	0.8	0.8	2.4	0.8	2.2
....GENUS	0.8	0.9	3.2	0.9	2.5

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	3	3	31	2	43	11
....CHLORELLA	--	-	--	-	2	2	1400#	82	--	-
....DICTYOSPHAERIUM	--	-	110	13	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	2	2	--	-	--	-
....TETRAEDRON	--	-	14	2	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	26#	22	--	-	3	3	31	2	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	29	3	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	29	7
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	--	-	230	13	130#	32
....MELOSIRA	--	-	--	-	--	-	--	-	29	7
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	16	13	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	1	1	--	-	--	-
....COCCONEIS	--	-	--	-	3	3	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	5	4	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	3	3	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	12	9	--	-	--	-
....FRAGILARIA	--	-	--	-	41#	34	--	-	--	-
....SYNEDRA	--	-	--	-	10	8	--	-	14	4
...NAVICULACEAE										
....NAVICULA	--	-	--	-	2	2	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	3	3	--	-	57	14
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	13	10	16	1	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	90#	78	720#	82	--	-	--	-	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	100#	25
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04045500 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 10,80 0900	JUL 10,80 0910	AUG 7,80 0830	SEP 10,80 0830
TOTAL CELLS/ML	550	100	51	150
DIVERSITY: DIVISION	0.9	1.3	0.0	0.9
.CLASS	0.9	1.3	0.0	0.9
..ORDER	0.9	1.8	0.0	1.6
...FAMILY	1.1	2.3	0.0	1.9
....GENUS	1.2	2.3	0.0	1.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...OOCYSTACEAE								
....ANKISTRODESMUS	13	2	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	13	8
...SCENEDESMACEAE								
....SCENEDESMUS	26	5	--	-	--	-	77#	50
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	13	8
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	13	13	51#	100	39#	25
....MELOSIRA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	13	2	--	-	--	-	--	-
....FRAGILARIA	--	-	26#	25	--	-	--	-
....SYNEDRA	39	7	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	13	8
...NITZSCHIACEAE								
....NITZSCHIA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	26	5	26#	25	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	440#	79	26#	25	--	-	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	13	13	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04045580 ST. MARYS RIVER ABOVE SAULT STE.MARIE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	89	90	90	90	91	91	96	94	95	98	94
2	89	90	90	90	91	90	91	96	94	96	98	96
3	89	90	89	91	91	91	90	96	93	97	98	96
4	88	90	89	91	90	91	91	94	94	98	98	96
5	88	89	90	91	91	90	91	94	94	96	98	96
6	88	89	90	91	91	91	91	94	94	98	98	96
7	87	89	90	90	91	90	91	94	94	99	98	96
8	87	89	90	91	91	90	90	94	92	96	98	94
9	87	89	91	91	90	91	94	94	91	98	100	96
10	90	87	90	89	91	91	95	93	94	98	98	95
11	89	87	90	90	91	90	94	94	94	97	98	94
12	90	89	89	90	91	90	88	94	94	96	99	96
13	90	88	89	91	90	90	88	94	94	97	98	95
14	90	89	89	90	90	90	91	94	96	95	98	95
15	90	89	90	91	90	90	92	95	96	96	98	95
16	90	89	90	89	90	90	90	94	96	91	98	96
17	90	87	89	89	90	90	88	95	96	94	98	96
18	90	87	90	89	90	91	88	95	94	96	98	96
19	90	89	89	89	90	90	90	96	94	96	98	94
20	89	89	90	89	90	91	90	94	95	95	98	94
21	89	90	90	90	90	91	94	94	95	95	99	95
22	88	89	90	90	89	90	89	94	95	94	98	94
23	90	89	90	90	90	90	88	94	95	94	98	95
24	90	89	90	90	90	90	90	93	95	96	98	97
25	89	90	90	89	90	90	92	94	95	94	97	97
26	90	90	90	89	91	91	94	96	95	94	96	96
27	90	90	90	90	91	91	92	96	95	96	98	98
28	90	90	90	91	91	92	93	94	95	96	98	---
29	90	90	90	91	90	91	94	92	94	95	98	96
30	90	89	90	90	---	91	96	94	94	94	100	96
31	90	---	89	90	---	92	---	94	---	96	98	---
MEAN	89	89	90	90	90	91	91	94	94	96	98	

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16.5	11.5	7.0	4.5	3.5	3.0	3.5	5.5	8.5	13.5	21.0	20.0
2	16.5	11.0	6.5	5.0	3.5	3.0	3.5	6.5	8.5	12.0	21.0	20.0
3	16.5	10.0	7.0	3.5	3.5	3.5	3.5	7.0	8.5	13.0	21.0	20.0
4	16.0	9.5	7.0	3.5	3.5	3.5	3.5	7.5	8.5	14.0	20.5	20.0
5	16.0	9.0	7.0	3.5	3.0	3.0	3.5	7.5	8.0	15.0	21.0	20.0
6	16.0	9.0	7.0	3.5	3.0	3.5	3.5	8.0	8.0	15.0	21.0	19.5
7	15.5	9.0	7.0	3.0	3.5	3.5	4.0	7.0	9.0	15.5	21.5	19.0
8	15.0	9.0	6.0	2.5	3.5	3.5	4.5	7.5	8.5	16.0	22.0	---
9	15.0	8.5	5.5	2.5	3.5	3.0	4.0	7.0	9.0	---	21.5	20.0
10	13.5	8.5	6.0	3.0	3.5	3.5	4.5	7.5	9.0	17.0	21.5	18.0
11	13.5	8.0	5.5	3.0	3.5	3.0	4.0	8.0	9.0	18.0	21.5	18.0
12	14.0	8.5	5.0	2.0	3.5	3.5	3.5	8.0	10.0	18.0	21.5	18.0
13	13.0	7.5	4.5	2.5	3.5	3.5	3.5	8.0	11.0	18.0	21.5	18.0
14	13.0	7.5	4.5	2.0	3.5	3.5	3.5	8.5	11.0	18.5	21.0	17.0
15	12.5	7.5	4.5	4.5	3.5	3.5	3.5	8.0	11.5	18.5	21.0	16.5
16	12.5	7.0	4.0	3.5	3.5	3.5	3.5	8.5	---	18.5	20.0	17.0
17	12.5	6.5	3.5	3.5	3.5	3.5	3.5	8.0	12.0	18.0	20.5	16.0
18	13.0	8.0	3.0	4.0	3.0	3.0	3.5	8.5	12.0	18.0	20.5	16.0
19	12.5	8.0	3.0	4.5	3.5	3.0	3.5	8.5	12.0	18.0	20.0	15.5
20	13.0	8.5	4.0	4.5	3.5	3.5	3.5	8.0	12.5	19.0	20.5	15.5
21	13.5	8.5	4.0	3.5	3.5	3.0	3.5	8.5	12.5	18.5	20.0	15.5
22	13.5	9.0	4.5	3.5	3.0	3.0	4.0	8.5	13.0	19.0	17.5	15.0
23	13.5	9.0	5.0	3.5	3.0	3.0	4.5	9.0	13.0	19.5	16.0	15.0
24	13.0	9.0	5.0	3.0	3.0	3.0	4.5	9.0	13.5	19.5	16.5	14.5
25	12.0	9.0	5.0	4.0	3.0	3.5	4.5	9.5	14.0	20.5	16.0	14.5
26	12.0	9.0	5.0	5.0	3.5	3.0	5.0	8.5	15.0	20.5	18.5	14.0
27	11.0	9.0	5.0	4.0	3.5	3.5	5.0	8.5	16.0	20.5	18.5	13.5
28	11.0	9.0	4.5	4.0	3.5	3.5	5.0	8.5	15.5	20.5	19.0	---
29	11.0	8.5	4.5	4.0	3.0	3.5	5.0	8.5	14.5	21.0	19.0	13.5
30	11.0	7.5	5.0	3.5	---	3.5	5.5	8.5	14.0	20.5	19.5	14.0
31	11.0	---	4.5	3.5	---	3.5	---	8.5	---	21.0	19.5	---
MEAN	13.5	8.5	5.0	3.5	3.5	3.5	4.0	8.0			20.0	

04056500 MANISTIQUE RIVER NEAR MANISTIQUE, MI

LOCATION.--Lat 46°01'50", long 86°09'40", in SE¼ sec.15, T.42 N., R.15 W., Schoolcraft County, Hydrologic Unit 04060106, on left bank 1.0 mi (1.6 km) downstream from West branch, 6.0 mi (9.7 km) northeast of Manistique, and at mile 19.5 mi (31.4 km).

DRAINAGE AREA.--1,100 mi² (2,849 km²), approximately.

PERIOD OF RECORD.--March 1938 to current year.

REVISED RECORDS.--WSP 1387: 1940-42(M), 1943, 1945. WSP 1627, 1727: 1938, 1939.

GAGE.--Water-stage recorder. Altitude of gage is 608 ft (185.3 m) from river-profile map (nearest ft). Prior to July 15, 1939, nonrecording gage at site 1,600 ft (487.7 m) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Since July 1948, slight regulation by dam on outlet of Manistique Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 1,441 ft³/s (40.81 m³/s), 17.79 in/yr (452 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 16,900 ft³/s (479 m³/s) May 11, 1960, gage height, 12.85 ft (3.917 m); minimum, 288 ft³/s (8.16 m³/s) Oct. 4, 1948; minimum gage height, 1.01 ft (0.308 m) Aug. 25, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 7,990 ft³/s (226 m³/s) Apr. 12, gage height, 11.06 ft (3.371 m); minimum, 472 ft³/s (13.4 m³/s) Sept. 8, 9, gage height, 2.44 ft (0.744 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	820	2830	2670	900	1200	900	1910	2520	912	892	637	557
2	808	2680	2400	880	1100	900	2090	2390	948	888	613	544
3	799	2570	2340	870	1050	900	2300	2230	999	872	585	535
4	799	2400	2490	870	1050	890	2470	2090	1020	836	571	535
5	795	2370	2520	860	1000	870	2600	1960	1020	804	634	529
6	797	2320	2530	860	960	870	2760	1830	996	761	729	511
7	805	2320	2350	860	950	870	3000	1720	999	740	754	493
8	808	2330	2170	860	930	880	3350	1590	1010	729	754	478
9	810	2290	2010	870	900	880	4130	1540	1020	712	701	487
10	814	2210	1960	870	880	890	5330	1510	1000	704	648	511
11	829	2120	2050	880	870	890	6970	1590	976	683	623	532
12	863	2040	2020	900	850	890	7850	1720	936	655	606	553
13	915	1960	1900	950	850	900	7710	1780	952	637	585	595
14	986	1860	1700	1050	840	900	7160	1740	1040	623	592	726
15	1070	1770	1600	1150	850	900	6550	1670	1130	627	588	840
16	1140	1690	1550	1300	860	900	5900	1580	1200	644	567	904
17	1160	1630	1500	1400	880	910	5290	1500	1200	683	547	932
18	1150	1600	1450	1550	890	930	4810	1420	1160	704	535	912
19	1140	1580	1400	1650	900	960	4350	1350	1120	690	523	896
20	1230	1610	1350	1700	910	1020	4040	1290	1110	683	520	880
21	1370	1690	1300	1750	920	1100	3830	1240	1070	680	514	904
22	1580	1820	1250	1800	920	1150	3720	1180	1020	694	511	1010
23	1940	1990	1200	1750	920	1200	3620	1130	980	683	499	1130
24	2420	2090	1150	1700	920	1200	3520	1100	936	651	490	1190
25	2760	2120	1150	1650	920	1250	3400	1060	888	623	496	1230
26	2990	2180	1100	1600	910	1250	3260	1020	904	602	538	1240
27	3130	2460	1050	1500	910	1250	3120	964	924	595	599	1200
28	3180	2740	1000	1450	910	1300	2960	928	944	592	644	1160
29	3170	2870	970	1400	900	1350	2790	908	940	606	641	1120
30	3080	2860	950	1300	---	1500	2640	888	912	613	620	1080
31	2950	---	930	1250	---	1700	---	892	---	644	585	---
TOTAL	47100	65080	52010	38380	26950	32300	123430	46330	30266	21550	18449	24214
MEAN	1520	2169	1678	1238	929	1042	4114	1495	1009	695	595	807
MAX	3180	2870	2670	1800	1200	1700	7850	2520	1200	892	754	1240
MIN	795	1580	930	860	840	870	1910	888	888	592	490	478
CFSM	1.38	1.97	1.53	1.13	.85	.95	3.74	1.36	.92	.63	.54	.73
IN.	1.59	2.20	1.76	1.30	.91	1.09	4.17	1.57	1.02	.73	.62	.82

CAL YR 1979 TOTAL 732840 MEAN 2008 MAX 8110 MIN 795 CFSM 1.83 IN 24.78
WTR YR 1980 TOTAL 526067 MEAN 1437 MAX 7850 MIN 478 CFSM 1.31 IN 17.79

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°58'18", long 86°14'35", in SE¼ SE¼ sec.1, T.41 N., R.16 W., Schoolcraft County, Hydrologic Unit 04060106, at Wyman State Nursery, 0.7 mi (1.1 km) downstream from Indian River, 0.8 mi (1.3 km) upstream from U.S. Highway 2 and 1.8 mi (2.9 km) upstream from mouth.

DRAINAGE AREA.--1,445 mi² (3,743 km²), approximately.

PERIOD OF RECORD.--Water years 1976 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1975 to current year.
WATER TEMPERATURES: October 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--In addition to the water-quality monitor, samples are collected periodically by a local observer. Monthly samples are collected as a cross-section sample at the Wyman State Nursery site or at railroad bridge 1,200 ft (366 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Occasional regulation by dam 0.4 mi (0.6 km) downstream. Intermittent ice cover during the winter period. Prior to Oct. 1, 1975, water quality data collected at station 04057005 Manistique River at Manistique, MI, 1.5 mi (2.4 km) downstream. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 254 micromhos Nov. 24, 1977; minimum (water years 1976, 1979-80), 57 micromhos Apr. 25, 1979.
WATER TEMPERATURES: Maximum, 26.5°C July 15, 23, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 246 micromhos July 1; minimum observed, 74 micromhos Apr. 16.
WATER TEMPERATURES: Maximum, 25.5°C July 15; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
NOV												
05...	1045	3100	144	7.4	4.5	11.4	89	K4	K10	65	15	19
DEC												
06...	1200	3200	135	7.8	.0	13.2	94	K2	K3	68	17	20
JAN												
08...	1130	1300	220	7.5	.0	11.8	83	K2	K6	110	25	32
FEB												
20...	1030	1300	195	7.5	.5	10.3	73	--	--	98	23	29
MAR												
20...	1030	1010	189	7.3	1.0	11.1	80	<1	25	92	10	27
APR												
16...	1000	6500	74	7.1	2.0	11.9	88	--	--	33	6	9.6
MAY												
16...	1000	2200	144	7.6	11.0	9.4	84	<1	<1	70	19	20
JUN												
12...	1145	884	194	7.8	14.5	9.6	96	--	K3	79	16	23
JUL												
17...	1010	930	194	7.8	21.0	7.7	90	K8	K5	98	24	29
AUG												
13...	1015	880	190	7.9	19.0	8.0	88	K16	K6	95	23	28
SEP												
17...	1050	1240	194	7.8	14.0	8.7	86	46	42	95	33	28

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	SODIUM PERCENT	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV											
05...	4.3	0	1.2	.1	5	.6	61	0	50	3.9	18
DEC											
06...	4.5	0	1.2	.1	5	.5	63	0	52	1.6	17
JAN											
08...	6.7	--	1.5	.1	4	.7	100	0	82	5.1	29
FEB											
20...	6.2	0	1.5	.1	3	.6	92	0	75	4.7	22
MAR											
20...	6.0	0	1.6	.1	4	.7	100	0	82	8.0	20
APR											
16...	2.2	--	.7	.1	4	.5	33	0	27	4.2	7.7
MAY											
16...	4.8	0	1.3	.1	4	.5	68	0	56	2.5	16
JUN											
12...	5.3	0	1.4	.1	4	.5	91	0	75	1.9	21
JUL											
17...	6.1	--	1.3	.1	3	.7	98	0	80	2.3	22
AUG											
13...	6.2	0	1.4	.1	3	.6	88	0	72	1.8	20
SEP											
17...	6.2	0	1.5	.1	3	.6	90	0	62	1.9	22

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
NOV											
05...	2.0	.1	5.3	106	82	887	--	.10	.090	.010	.11
DEC											
06...	1.6	.0	5.6	92	82	795	.09	.06	.060	.030	.07
JAN											
08...	1.6	.1	7.6	125	129	439	.15	.15	--	.080	.07
FEB											
20...	1.4	.1	7.6	131	115	460	--	.13	--	.120	.12
MAR											
20...	1.5	.1	7.2	109	114	297	--	.20	--	.090	.10
APR											
16...	1.3	.0	3.8	49	42	860	.10	.04	.040	.010	.05
MAY											
16...	1.4	.1	4.2	99	79	588	--	.06	.050	.030	.06
JUN											
12...	1.4	.1	4.5	133	96	317	.02	.01	.010	.010	.01
JUL											
17...	1.4	.1	5.4	115	111	289	.09	.07	.010	.000	.01
AUG											
13...	1.5	.1	6.8	134	109	318	--	.08	--	.040	.01
SEP											
17...	1.8	.1	7.5	116	106	388	--	.11	--	.040	.02

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV											
05...	1.1	1.2	1.3	5.7	.050	.15	.020	--	3	25	100
DEC											
06...	.31	.37	.46	2.0	.010	.03	.000	8.1	5	43	100
JAN											
08...	.43	.49	.64	2.8	.010	.03	.010	6.4	--	--	--
FEB											
20...	.58	.66	.78	3.5	.010	.03	.000	--	3	11	100
MAR											
20...	.28	.38	.53	2.3	.010	.03	.000	6.0	2	5.5	100
APR											
16...	.72	.76	.86	3.8	.020	.06	.010	9.2	8	140	100
MAY											
16...	.24	.29	.34	1.5	.040	.12	.040	8.3	7	42	100
JUN											
12...	.40	.41	.43	1.9	.020	.06	.000	--	5	12	100
JUL											
17...	.33	.36	.43	1.9	.020	.06	.010	6.2	5	13	100
AUG											
13...	.44	.45	.52	2.3	.030	.09	.010	--	1	2.4	100
SEP											
17...	.21	.23	.32	1.4	.000	.00	.000	11	3	10.0	100

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)
NOV 05...	1045	1	1	300	30	--	2	20	20	--
FEB 20...	1030	1	0	<50	20	--	4	10	10	0
JUN 12...	1145	0	0	<50	20	0	0	10	<10	0
AUG 13...	1015	1	1	200	<50	0	0	--	20	0

DATE	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
NOV 05...	2	4	2	670	410	7	1	40	10	.5
FEB 20...	0	1	1	920	510	1	1	40	30	.2
JUN 12...	0	4	2	800	330	2	1	30	10	<.1
AUG 13...	0	2	2	830	410	5	1	50	20	.3

DATE	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
NOV 05...	.2	5	1	0	0	0	40	4	12	.5
FEB 20...	.2	2	1	0	0	0	20	10	9.0	.2
JUN 12...	<.1	1	0	0	0	0	10	4	14	.1
AUG 13...	.3	1	0	0	0	0	10	6	8.9	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
DEC 06...	1200	31	.00	.080	.080	.140	.000
MAY 16...	1000	30	.00	.236	.236	.120	.000
AUG 13...	1015	27	617	1.26	1.07	1.15	.070

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 28,78	APR 11,79	MAY 18,79	JUN 20,79	JUL 19,79
TIME	1030	1115	1230	0950	1000
TOTAL CELLS/ML	8700	83	630	2300	26000
DIVERSITY: DIVISION	0.5	0.9	1.4	1.1	0.2
.CLASS	0.5	0.9	1.4	1.1	0.2
..ORDER	0.5	0.9	1.9	1.3	0.3
...FAMILY	0.5	0.9	2.3	1.7	0.3
....GENUS	0.7	0.9	2.6	2.0	0.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	210	9	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	26	1	*	0
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	*	0
....OOCYSTIS	69	1	--	-	--	-	52	2	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	140	2	--	-	--	-	--	-	--	-
....SCENEDESMUS	*	0	--	-	210#	33	100	5	--	-
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	26	1	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	*	0	--	-	--	-	--	-	220	1
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	39	6	26	1	*	0
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	320	4	--	-	--	-	64	3	*	0
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	*	0	--	-	26	4	13	1	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	26	4	100	5	--	-
....FRAGILARIA	--	-	28#	33	170#	27	--	-	--	-
....SYNEDRA	*	0	--	-	26	4	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	13	2	26	1	--	-
...NITZSCHIACEAE										
....DENTICULA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	*	0	--	-	39	6	13	1	210	1
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	*	0

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 28,78 1030		APR 11,79 1115		MAY 18,79 1230		JUN 20,79 0950		JUL 19,79 1000	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	170	2	--	-	--	-	130	6	--	-
....ANACYSTIS	7900#	91	--	-	98	14	1500#	65	25000#	96
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	55#	67	--	-	--	-	190	1
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	*	0	--	-	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 15,79	SEP 5,79	DEC 6,79	MAR 20,80	MAY 16,80
TIME	1145	1040	1200	1030	1000
TOTAL CELLS/ML	2600	15000	1000	450	280
DIVERSITY: DIVISION	0.3	0.6	1.0	0.2	1.2
.CLASS	0.3	0.6	1.0	0.2	1.2
..ORDER	1.2	1.1	1.2	0.2	1.7
...FAMILY	1.2	1.2	1.2	0.2	2.3
....GENUS	1.6	0.0	1.3	0.2	2.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	*	0	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	150	1	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	82	1	10	1	13	3	--	-
....CHLORELLA	--	-	170	1	15	2	--	-	--	-
....CHODATELLA	--	-	--	-	5	1	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	13	5
....TETRAEDRON	26	1	82	1	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	440	3	--	-	--	-	51#	18
....SCENEDESMUS	--	-	160	1	--	-	--	-	--	-
....TETRASTRUM	51	2	*	0	--	-	--	-	51#	18
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	*	0	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	*	0	--	-	--	-	--	-
....STAURASTRUM	--	-	*	0	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	82	1	190#	19	--	-	90#	32
....MELOSIRA	--	-	*	0	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	*	0	--	-	--	-	--	-
....COCCONEIS	--	-	*	0	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	40	4	--	-	26	9
....FRAGILARIA	--	-	*	0	--	-	--	-	--	-
....SYNEDRA	--	-	150	1	20	2	--	-	13	5
...NAVICULACEAE										
....NAVICULA	--	-	*	0	--	-	--	-	13	5
...NITZSCHIACEAE										
....DENTICULA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	26	1	--	-	--	-	--	-	13	5
...SURIRELLACEAE										
....SURIRELLA	--	-	*	0	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	*	0	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM! EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED! LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 15,79 1145		SEP 5,79 1040		DEC 6,79 1200		MAR 20,80 1030		MAY 16,80 1000	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	*	0	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	*	0	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	460#	17	580	4	--	-	--	-	--	-
....ANACYSTIS	540#	20	12000#	76	720#	72	--	-	13	5
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	1500#	58	--	-	--	-	440#	97	--	-
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	1300	9	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE	--	-	*	0	--	-	--	-	--	-
....TRACHELOMONAS	--	-	*	0	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	*	0	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 12,80	JUL 17,80	AUG 13,80	SEP 17,80
TIME	1145	1010	1015	1050
TOTAL CELLS/ML	9600	1400	5700	6700
DIVERSITY: DIVISION	0.3	1.4	0.7	0.7
.CLASS	0.3	1.4	0.7	0.7
..ORDER	0.4	2.0	1.1	0.8
...FAMILY	0.4	2.3	1.3	0.9
....GENUS	0.6	2.4	1.3	1.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	100	2	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	51	1	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	51	4	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	26	2	120	2	--	-
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	*	0	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	*	0	--	-	64	1	77	1
....SELENASTRUM	--	-	--	-	39	1	*	0
....TETRAEDRON	--	-	13	1	--	-	*	0
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	51	1
....SCENEDESMUS	170	2	210	15	210	4	100	2
....TETRASTRUM	--	-	--	-	--	-	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	--	-	*	0	--	-
....COSMARIUM	--	-	--	-	--	-	--	-
....STAURASTRUM	*	0	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	72	1	26	2	39	1	39	1
....MELOSIRA	--	-	26	2	--	-	530	8
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	*	0
....SYNEDRA	--	-	26	2	51	1	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	*	0
...NITZSCHIACEAE								
....DENTICULA	--	-	--	-	--	-	*	0
....NITZSCHIA	*	0	77	6	100	2	51	1
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	*	0	--	-	--	-	--	-
...OCHROMONADACEAE								
....OCHROMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 12,80		JUL 17,80		AUG 13,80		SEP 17,80	
TIME	1145		1010		1015		1050	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	26	2	--	-	*	0
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	13	1	--	-	*	0
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	150	2
....ANACYSTIS	8800#	92	710#	51	4600#	80	5600#	83
....COCCOCHLORIS	230	2	--	-	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	190	2	--	-	350	6	--	-
....PHORMIDIUM	--	-	190	14	--	-	--	-
....SCHIZOTHRIX	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-
	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	*	0	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	204	196	200	130	125	127	122	110	114	190	189	189
2	201	196	198	136	133	134	132	123	130	194	191	192
3	206	201	203	141	136	139	142	132	137	195	191	193
4	205	201	203	138	129	133	147	142	145	199	195	197
5	202	199	201	143	136	140	147	145	146	204	199	202
6	203	200	201	144	141	142	145	143	144	210	205	208
7	203	201	202	144	141	143	144	142	143	214	210	213
8	204	195	198	145	142	144	149	143	146	221	215	219
9	203	196	200	144	135	139	156	151	154	225	221	223
10	201	198	200	144	142	143	158	156	156	225	220	223
11	197	194	196	143	141	142	160	156	158	220	217	218
12	196	194	195	147	143	145	167	160	164	220	218	219
13	194	191	192	153	148	151	173	168	170	220	218	220
14	192	183	188	151	149	150	176	174	175	220	216	218
15	195	184	189	160	149	155	177	173	175	215	209	212
16	191	183	188	161	158	160	183	178	180	208	203	206
17	186	175	182	166	159	163	188	183	186	203	199	201
18	182	167	174	168	163	166	189	187	188	198	194	195
19	177	166	172	169	167	168	193	190	192	194	188	191
20	178	173	175	168	166	167	193	191	192	188	183	186
21	179	173	176	171	167	169	192	190	191	182	178	180
22	176	165	170	169	164	167	191	189	190	178	177	178
23	164	156	160	163	156	160	190	188	189	181	177	179
24	156	145	150	156	149	152	190	186	188	184	180	183
25	144	138	142	152	149	151	186	181	184	185	183	184
26	138	120	131	152	146	149	182	180	181	188	185	186
27	129	109	117	146	145	146	182	178	179	189	187	188
28	129	122	127	146	140	142	180	178	179	190	188	189
29	121	112	117	141	136	140	181	178	180	190	188	189
30	123	113	117	135	115	126	185	181	183	190	188	190
31	128	120	124	---	---	---	188	185	186	192	190	191
MONTH	206	109	174	171	115	148	193	110	169	225	177	199

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	192	191	191	203	202	203	178	166	174	156	139	144
2	192	190	191	205	201	203	170	166	168	157	147	152
3	193	191	192	204	201	202	170	156	162	154	147	149
4	193	192	192	204	202	203	160	154	157	151	134	142
5	193	191	192	205	202	204	155	146	152	147	135	142
6	193	192	192	203	201	202	153	137	144	148	142	145
7	195	191	192	206	203	204	140	132	136	144	141	143
8	195	193	194	205	202	203	146	134	139	142	140	141
9	196	193	194	203	201	202	144	131	138	148	141	144
10	197	194	196	205	203	204	134	121	126	153	146	150
11	197	196	196	207	203	206	122	100	111	158	150	155
12	197	195	197	209	206	208	126	109	116	160	154	157
13	199	196	197	208	205	207	109	76	89	156	148	153
14	200	198	198	208	205	207	98	77	87	153	144	147
15	199	196	197	208	205	206	101	87	96	152	143	147
16	198	195	197	209	206	208	98	85	91	156	150	153
17	199	196	198	207	205	206	107	91	99	163	153	156
18	198	196	197	208	205	206	111	102	106	163	156	159
19	198	196	197	206	204	205	114	105	108	164	158	161
20	198	195	196	207	204	206	123	112	117	168	162	166
21	197	196	197	205	202	203	123	117	120	173	166	169
22	197	195	196	203	198	201	125	116	120	180	173	176
23	197	195	196	198	196	197	126	112	121	186	179	182
24	198	195	196	196	194	195	119	111	116	188	180	183
25	197	195	196	195	193	194	127	119	123	192	188	190
26	198	196	197	192	189	191	130	120	126	193	188	190
27	199	198	199	190	188	189	140	128	133	194	190	192
28	200	198	199	191	188	190	136	131	134	196	192	194
29	202	198	200	193	190	191	140	132	136	199	194	195
30	---	---	---	189	185	187	144	138	140	203	198	200
31	---	---	---	186	179	183	---	---	---	202	200	201
MONTH	202	190	196	209	179	201	178	76	126	203	134	164

04057004 MANISTIQUE RIVER ABOVE MANISTIQUE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	202	198	201	246	178	217	197	188	190	205	201	202
2	199	196	198	179	175	177	205	189	197	207	203	205
3	200	197	199	184	173	179	196	185	187	207	206	207
4	202	198	200	183	179	181	205	196	200	209	204	206
5	201	195	198	185	179	182	193	187	189	213	202	208
6	197	194	195	181	176	178	189	186	188	212	205	208
7	197	190	194	185	176	180	193	186	190	212	209	210
8	189	185	187	184	176	179	199	191	195	213	207	211
9	190	185	187	183	177	181	191	187	189	213	203	208
10	192	188	190	185	179	182	199	193	195	212	204	209
11	192	186	188	189	180	183	197	194	195	208	201	205
12	196	187	192	183	178	180	194	187	189	211	202	206
13	197	190	193	188	179	184	193	187	189	205	198	201
14	196	189	193	188	183	184	198	194	196	203	197	200
15	193	183	185	191	185	188	199	195	197	211	200	204
16	187	181	184	188	183	184	202	197	199	204	201	202
17	188	183	185	188	182	186	203	198	200	205	200	202
18	184	178	181	185	179	183	206	199	203	206	194	201
19	178	172	174	183	180	182	205	198	199	200	189	196
20	176	169	173	186	176	182	206	197	200	194	184	190
21	183	172	176	184	176	180	214	206	211	204	193	196
22	183	172	176	184	176	181	218	205	213	193	186	190
23	201	179	192	187	183	185	204	200	202	198	181	187
24	202	195	199	186	180	184	212	200	207	182	175	178
25	201	196	199	188	181	185	213	209	211	184	173	180
26	201	194	199	188	180	183	210	207	209	175	168	172
27	200	186	194	193	183	189	209	203	206	175	167	170
28	195	183	188	194	187	191	206	198	202	174	168	172
29	215	194	201	191	187	189	206	197	202	176	165	171
30	240	215	227	194	188	191	199	196	198	177	171	174
31	---	---	---	193	188	190	203	197	201	---	---	---
MONTH	240	169	192	246	173	185	218	185	198	213	165	196

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	17.0	16.5	16.5	7.0	6.5	7.0	.0	.0	---	.0	.0	.0
2	16.5	15.5	16.0	6.0	5.5	6.0	.0	.0	---	.0	.0	.0
3	16.0	15.0	15.5	6.0	5.5	5.5	.5	.0	---	.0	.0	.0
4	15.0	14.0	14.5	5.5	4.5	5.0	1.0	.5	---	.0	.0	.0
5	14.0	13.5	13.5	5.0	5.0	---	1.0	1.0	---	.0	.0	.0
6	13.5	12.0	13.0	5.0	4.5	---	1.0	.5	---	.0	.0	.0
7	12.0	11.5	11.5	4.5	4.0	---	1.0	.5	---	.0	.0	.0
8	11.5	10.0	10.5	4.0	2.0	---	1.0	.5	---	.0	.0	.0
9	10.0	9.5	10.0	2.0	1.0	---	.5	.0	---	.0	.0	.0
10	9.5	8.5	9.0	1.5	1.0	---	.5	.0	---	.0	.0	.0
11	8.0	7.5	8.0	1.0	1.0	---	.0	.0	.0	.0	.0	.0
12	7.5	6.0	7.0	1.5	1.0	---	.0	.0	.0	.0	.0	.0
13	6.0	4.0	5.0	1.5	1.5	---	.0	.0	.0	.0	.0	.0
14	5.0	3.5	4.5	1.5	1.5	---	.0	.0	.0	.0	.0	.0
15	7.5	4.5	6.0	2.0	1.5	---	.0	.0	.0	.0	.0	.0
16	8.5	6.5	7.5	2.0	2.0	---	.0	.0	.0	.0	.0	.0
17	9.5	8.0	9.5	2.5	2.0	---	.0	.0	.0	.5	.0	.0
18	8.5	8.0	8.5	2.5	2.5	---	.0	.0	.0	.5	.0	.0
19	10.0	9.5	9.0	2.5	2.5	---	.0	.0	.0	.5	.0	.0
20	11.0	10.0	10.5	3.0	2.5	---	.0	.0	.0	.0	.0	.0
21	12.0	11.0	12.0	3.5	2.5	---	.0	.0	.0	.0	.0	.0
22	12.0	11.0	11.5	4.0	3.0	---	.0	.0	.0	.0	.0	.0
23	11.0	10.0	10.5	4.5	4.0	---	.0	.0	.0	.0	.0	.0
24	10.0	8.0	9.0	4.0	4.0	---	.0	.0	.0	.0	.0	.0
25	8.0	6.0	7.0	4.0	2.5	---	.0	.0	.0	.0	.0	.0
26	6.0	4.5	5.0	4.0	4.0	---	.0	.0	.0	.0	.0	.0
27	4.5	4.0	4.0	4.0	3.5	---	.0	.0	.0	.0	.0	.0
28	4.5	4.0	4.0	3.5	1.0	---	.0	.0	.0	.0	.0	.0
29	4.5	4.0	4.0	1.0	.0	---	.0	.0	.0	.0	.0	.0
30	5.5	4.0	4.5	.0	.0	---	.0	.0	.0	.0	.0	.0
31	6.5	5.0	5.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	17.0	3.5	9.0	7.0	.0		1.0	.0		.5	.0	.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	1.5	.5	---	13.5	10.5	11.5
2	.0	.0	.0	.0	.0	.0	4.0	1.0	---	14.5	12.0	13.5
3	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	16.0	13.0	14.5
4	.0	.0	.0	.0	.0	.0	4.0	2.0	3.0	16.0	14.5	15.5
5	.0	.0	.0	.0	.0	.0	4.5	3.0	4.0	16.5	15.5	16.0
6	.0	.0	.0	.0	.0	.0	4.5	3.0	3.5	16.0	14.5	15.0
7	.0	.0	.0	.0	.0	.0	3.5	3.0	3.0	14.5	12.0	13.0
8	.0	.0	.0	.0	.0	.0	3.0	3.0	3.0	12.0	11.0	11.5
9	.0	.0	.0	.0	.0	.0	3.0	2.5	3.0	11.0	10.0	10.5
10	.0	.0	.0	.5	.0	.0	3.0	1.5	2.0	10.0	9.5	10.0
11	.0	.0	.0	.0	.0	.0	2.0	1.5	---	11.0	9.5	10.5
12	.0	.0	.0	.0	.0	.0	2.0	2.0	---	11.5	10.5	11.0
13	.0	.0	.0	.0	.0	.0	3.5	2.5	---	11.5	11.0	11.5
14	.0	.0	.0	.0	.0	.0	2.5	2.0	---	11.0	10.5	11.0
15	.0	.0	.0	.0	.0	.0	3.0	3.0	---	12.5	10.5	11.5
16	.0	.0	.0	.5	.0	.0	4.0	1.5	---	14.0	11.5	12.5
17	.0	.0	.0	1.0	.0	.5	5.0	4.0	---	14.5	13.0	14.0
18	.0	.0	.0	1.0	.0	.5	7.0	4.5	5.5	15.5	14.5	14.5
19	.0	.0	.0	1.5	.0	1.0	8.5	6.5	7.5	17.0	14.5	15.5
20	.5	.0	.0	1.5	.0	1.0	8.5	8.0	---	18.0	16.0	17.0
21	.5	.0	.0	1.5	.0	---	9.5	8.0	9.0	19.0	16.5	17.5
22	.5	.0	.0	1.5	.0	---	11.0	9.0	10.0	20.5	18.0	19.0
23	.5	.0	.0	1.0	.0	---	10.0	9.0	9.5	20.5	18.5	19.5
24	.5	.0	.0	1.5	.0	---	9.0	7.5	8.5	22.0	19.0	20.5
25	.0	.0	.0	1.5	.0	---	7.5	7.0	7.5	22.0	20.5	21.5
26	.0	.0	.0	1.0	.0	---	7.5	7.0	7.0	21.5	20.0	20.5
27	.0	.0	.0	1.0	.0	---	9.0	7.0	7.5	20.5	19.5	20.0
28	.0	.0	.0	1.0	.5	---	9.0	7.5	7.5	20.5	18.5	19.5
29	.0	.0	.0	1.5	.5	---	9.5	8.5	9.0	19.5	18.0	18.5
30	---	---	---	1.0	.5	---	11.0	9.0	10.0	18.5	18.0	18.0
31	---	---	---	1.5	.5	---	---	---	---	18.0	17.0	17.5
MONTH	.5	.0	.0	1.5	.0		11.0	.5		22.0	9.5	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.5	16.0	16.5	20.0	19.0	19.5	23.0	21.5	22.0	21.0	20.5	20.5
2	16.5	15.5	16.0	20.5	18.0	19.0	23.0	22.5	22.5	21.0	20.0	20.5
3	17.5	15.5	16.5	21.5	19.0	20.0	22.5	21.5	22.0	20.5	19.5	20.0
4	18.5	16.5	17.5	22.5	20.5	21.5	22.5	21.5	22.0	20.5	19.5	20.0
5	18.0	17.0	18.0	22.0	21.0	21.5	23.0	21.5	22.0	20.5	19.5	20.0
6	19.0	16.5	17.5	22.5	20.0	21.0	23.5	22.0	22.5	20.5	19.0	19.5
7	18.5	17.0	18.0	22.0	21.0	21.5	24.0	22.5	23.0	21.5	20.0	20.5
8	17.0	15.5	16.0	23.0	21.5	22.0	24.5	23.5	24.0	21.5	20.5	21.0
9	16.0	15.0	15.5	23.5	22.5	23.0	24.0	23.5	24.0	21.5	20.0	21.0
10	15.5	15.0	15.0	24.5	23.0	23.5	24.0	23.0	23.5	20.0	19.0	19.5
11	16.5	14.0	15.5	25.0	23.5	24.5	23.5	22.0	22.5	19.0	18.0	18.5
12	17.0	15.5	16.0	24.5	23.5	24.0	22.0	21.0	21.5	18.5	17.0	18.0
13	17.0	16.0	16.5	24.5	23.5	24.0	21.5	21.0	21.0	17.0	17.0	17.0
14	17.5	16.5	17.0	24.0	23.5	24.0	21.5	20.5	21.0	17.0	16.0	16.5
15	17.5	16.5	17.0	25.5	23.5	24.0	21.0	20.5	20.5	16.0	15.5	15.5
16	18.0	16.5	17.0	25.0	24.5	24.5	21.0	19.5	20.0	15.5	15.5	15.5
17	18.5	16.5	17.5	25.0	22.5	24.0	20.5	20.0	20.0	15.0	14.0	14.5
18	18.5	17.5	18.0	24.0	22.0	23.0	21.0	19.5	20.0	15.0	14.0	14.5
19	18.0	16.5	17.5	24.0	22.0	22.5	21.5	20.5	21.0	14.0	13.5	13.5
20	19.0	17.0	18.0	24.0	22.5	23.0	22.0	21.0	21.5	14.0	13.5	14.0
21	19.5	18.0	18.5	23.5	22.0	22.5	23.0	21.5	22.0	14.0	14.0	14.0
22	20.5	18.0	19.0	23.5	22.0	22.5	24.0	22.0	22.5	14.0	13.5	14.0
23	21.5	19.0	20.0	23.0	21.5	22.0	24.0	22.0	23.0	14.0	13.0	13.5
24	22.5	20.5	21.5	24.0	22.0	23.0	23.5	22.0	22.5	12.5	12.0	12.0
25	23.0	22.0	22.5	23.5	22.0	23.0	23.0	21.5	22.0	12.0	11.0	11.5
26	23.5	22.5	23.0	22.5	21.5	22.0	22.5	21.5	22.0	11.0	10.5	11.0
27	23.0	21.5	22.5	22.5	21.5	21.5	21.5	20.5	21.0	11.0	10.5	10.5
28	21.5	19.5	20.5	23.0	21.5	22.0	21.0	20.0	20.0	11.0	10.0	10.5
29	20.0	19.5	19.5	23.0	21.5	22.0	20.5	19.5	20.0	11.5	10.5	11.0
30	20.0	18.5	19.5	23.0	22.0	22.5	20.5	19.5	20.0	12.0	11.5	11.5
31	---	---	---	23.0	21.5	22.0	21.0	19.5	20.5	---	---	---
MONTH	23.5	14.0	18.0	25.5	18.0	22.5	24.5	19.5	21.5	21.5	10.0	16.0

04057510 STURGEON RIVER NEAR NAHMA JUNCTION, MI

LOCATION.--Lat 45°56'35", long 86°42'20", in SW¼ SE¼ sec.17, T.41 N., R.19 W., Delta County, Hydrologic Unit 04030112, Hiawatha National Forest, on left bank 30 ft (9 m) upstream from bridge on Forest Service Road 2231, 500 ft (152 m) downstream from Mormon Creek, 0.1 mi (0.2 km) east of Federal Forest Highway 13, and 3.2 mi (5.1 km) north of Nahma Junction.

DRAINAGE AREA.--183 mi² (474 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Datum of gage is 610.99 ft (186.230 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 209 ft³/s (5.919 m³/s), 15.51 in/yr (394 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) Apr. 18, 1971, Apr. 30, 1972, gage height, 9.85 ft (3.002 m); minimum, 35 ft³/s (0.99 m³/s) Sept. 11, 12, 13, 14, 1976, gage height, 3.58 ft (1.091 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,030 ft³/s (29.2 m³/s) Apr. 10, gage height, 8.02 ft (2.444 m); minimum, 60 ft³/s (1.70 m³/s) July 10, 11, 12, 13, gage height, 3.83 ft (1.167 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	329	327	140	130	78	170	286	94	72	75	120
2	82	326	300	135	125	78	185	269	113	70	72	113
3	81	294	290	130	120	78	200	251	116	68	76	106
4	87	268	275	125	115	78	212	233	105	65	72	104
5	86	252	255	120	110	78	256	215	97	66	121	95
6	84	288	240	125	100	78	317	196	109	67	124	87
7	84	296	227	125	96	78	386	181	110	65	109	81
8	88	279	218	130	94	78	506	169	107	65	125	78
9	90	256	215	140	92	78	864	160	104	62	131	113
10	95	234	210	150	90	78	1010	154	96	60	104	125
11	99	214	205	155	88	78	881	233	89	61	91	104
12	104	204	197	160	86	78	738	252	83	61	87	94
13	167	189	198	170	84	78	633	218	84	61	80	211
14	218	180	185	180	82	78	541	191	105	66	78	347
15	206	174	185	190	82	78	472	173	106	74	75	333
16	185	167	180	200	80	78	411	157	98	73	71	276
17	166	164	185	205	78	80	380	145	90	91	69	234
18	151	164	190	215	78	80	361	136	84	84	68	213
19	173	170	195	220	78	84	366	130	103	81	67	229
20	224	210	200	220	78	86	405	123	119	80	238	214
21	248	223	205	220	78	92	407	116	102	105	279	298
22	309	281	215	215	78	96	402	109	92	119	202	427
23	540	302	227	210	78	98	393	104	83	98	140	377
24	599	286	250	200	78	100	371	100	77	84	112	322
25	543	262	245	190	78	100	358	95	73	77	132	299
26	469	335	226	180	78	105	343	90	72	74	174	280
27	418	494	206	170	78	110	329	87	76	70	262	257
28	391	455	189	165	78	110	313	85	75	66	237	229
29	361	385	167	155	78	115	301	82	74	70	189	203
30	330	342	157	145	---	125	297	82	74	75	155	185
31	304	---	150	140	---	145	---	90	---	78	131	---
TOTAL	7063	8023	6706	5225	2588	2774	12808	4912	2810	2316	3946	6154
MEAN	228	267	216	169	89.2	89.5	427	158	93.7	74.7	127	205
MAX	599	494	327	220	130	145	1010	286	119	119	279	427
MIN	81	164	150	120	78	78	170	82	72	60	67	78
CFSM	1.25	1.46	1.18	.92	.49	.49	2.33	.86	.51	.41	.69	1.12
IN.	1.44	1.63	1.36	1.06	.53	.56	2.60	1.00	.57	.47	.80	1.25

CAL YR 1979 TOTAL 100223 MEAN 275 MAX 1480 MIN 81 CFSM 1.50 IN 20.37
WTR YR 1980 TOTAL 65325 MEAN 178 MAX 1010 MIN 60 CFSM .97 IN 13.28

04057800 MIDDLE BRANCH ESCANABA RIVER AT HUMBOLDT, MI

LOCATION.--Lat 46°29'57", long 87°53'11", in SW¼ sec.1, T.47 N., R.29 W., Marquette County, Hydrologic Unit 04030110, on left bank 15 ft (5 m) upstream from county highway, 0.3 mi (0.5 km) north of Humboldt, and 1.5 mi (2.4 km) downstream from Halfway Creek.

DRAINAGE AREA.--46.0 mi² (119.1 km²).

PERIOD OF RECORD.--June 1959 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Oct. 3, 1960. Datum of gage is 1,521.20 ft (463.662 m) Cleveland-Cliffs Iron Co. datum. Prior to Sept. 1, 1960, nonrecording gage at same site and datum.

REMARKS.--Records fair. From July 1960 to June 1972, some diversion 100 ft (30 m) above station by industry for iron ore processing; figures of runoff adjusted. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 61.0 ft³/s (1.728 m³/s), 18.01 in/yr (457 mm/yr), adusted for diversion 1960 to 1972.

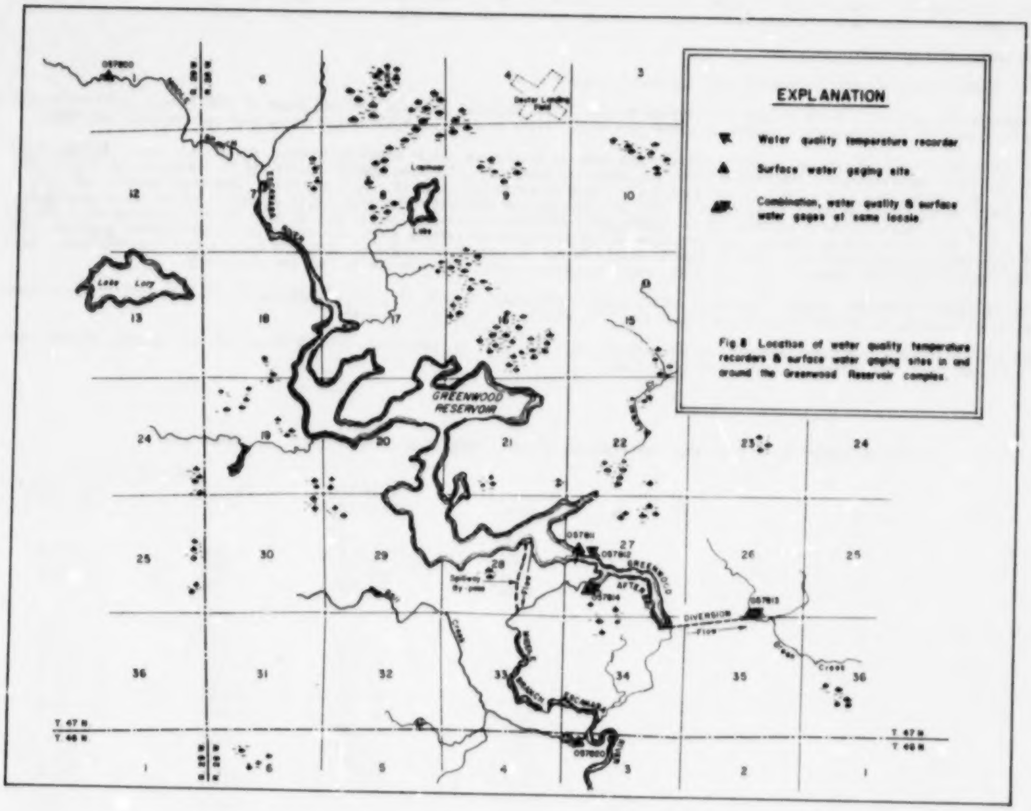
EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,640 ft³/s (46.4 m³/s) Apr. 24, 1960, gage height, 8.30 ft (2.530 m), from floodmark; minimum, 4.0 ft³/s (0.11 m³/s) Sept. 12, 1976; minimum gage height, 1.07 ft (0.326 m) Aug. 24, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 390 ft³/s (11.0 m³/s) Oct. 24, gage height, 5.19 ft (1.582 m); minimum, 10 ft³/s (0.28 m³/s) Aug. 23, gage height, 1.70 ft (0.518 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	14	192	49	25	21	17	40	100	60	18	17	20
2	15	251	47	25	21	17	48	88	56	17	15	21
3	16	218	46	25	20	17	53	78	49	15	14	22
4	17	174	44	25	20	16	51	69	40	14	13	25
5	17	144	44	25	19	16	67	62	32	20	15	18
6	16	132	42	25	19	16	87	56	32	18	14	14
7	16	115	43	26	19	17	118	53	43	31	13	13
8	16	100	42	26	19	16	156	50	107	36	13	11
9	18	97	40	26	18	16	183	50	100	25	12	18
10	20	85	40	26	18	16	187	49	70	20	12	18
11	20	73	40	27	18	16	169	50	52	18	17	13
12	21	65	39	28	18	16	143	50	41	16	17	13
13	30	61	38	29	18	16	120	46	37	15	15	40
14	44	57	36	30	18	15	102	46	66	30	15	177
15	37	55	36	31	18	15	91	44	65	41	16	226
16	45	54	36	31	18	15	83	41	50	29	15	136
17	51	54	36	32	19	18	90	38	39	22	13	83
18	46	56	36	33	18	18	133	36	32	21	13	74
19	48	53	35	33	18	18	166	33	28	22	13	80
20	54	72	34	32	19	21	221	27	23	37	13	74
21	57	66	33	32	19	20	280	27	21	42	13	140
22	139	62	32	31	19	20	304	26	18	34	13	218
23	279	61	31	30	19	18	306	23	18	28	11	175
24	374	58	31	29	19	18	276	22	17	23	15	118
25	290	52	30	28	19	18	221	20	16	38	25	114
26	210	54	29	27	19	20	183	19	16	45	25	145
27	168	58	28	26	18	20	170	17	15	30	21	148
28	170	54	27	25	18	21	152	15	14	24	16	103
29	182	52	26	24	18	23	133	14	20	22	14	78
30	174	50	26	23	---	27	117	16	22	19	17	68
31	169	---	25	22	---	33	---	37	---	18	20	---
TOTAL	2773	2673	1121	857	544	570	4450	1302	1199	788	475	2395
MEAN	89.5	89.1	36.2	27.6	18.8	18.4	148	42.0	40.0	25.4	15.3	79.8
MAX	374	251	49	33	21	33	306	100	107	45	25	226
MIN	14	50	25	22	18	15	40	14	14	14	11	11
CFSM	1.95	1.94	.79	.60	.41	.40	3.22	.91	.87	.55	.33	1.74
IN.	2.24	2.16	.91	.69	.44	.46	3.60	1.05	.97	.64	.38	1.94

CAL YR 1979 TOTAL 31722 MEAN 86.9 MAX 1000 MIN 14 CFSM 1.89 IN 25.65
WTR YR 1980 TOTAL 19147 MEAN 52.3 MAX 374 MIN 11 CFSM 1.14 IN 15.48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EXPLANATION
▼ Water quality temperature recorder
▲ Surface water gaging site
Combination, water quality & surface water gages at same locale

Fig 8 Location of water quality temperature recorders & surface water gaging sites in and around the Greenwood Reservoir complex.

Greenwood Reservoir is formed by an earth/rockfill main dam (Greenwood Dam) and several earthfill dikes surrounding the storage area. Storage began Dec. 22, 1972, and the fixed-crest concrete spillway was completed in September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm³) at a spillway elevation of 1515 ft (461.8 m). At pool elevation exceeding 1515 ft (461.8 m), water flows over the spillway into the Middle Branch Escanaba River below Greenwood Release (04057814). At lower pool elevations, outflow from Greenwood Reservoir into Greenwood Afterbay is completely regulated by the multiport outlet of Greenwood Dam. Greenwood Afterbay has two outlets; one for diversion by pipeline into Green Creek and the second for releasing flows to Middle Branch Escanaba River. Water temperatures are measured directly below Greenwood Dam (Greenwood Afterbay, 04057813), and the gaging station below the release from the afterbay to Middle Branch Escanaba River (Greenwood Release, 04057814).

04057811 GREENWOOD RESERVOIR NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at downstream side of dam, on Middle Branch Escanaba River, 3.7 mi (6.0 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2 (174.6 km^2).

PERIOD OF RECORD.--December 1972 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,400.00 ft (246.720 m) National Geodetic Vertical Datum of 1929 (levels by Cleveland-Cliffs Iron Co.); gage readings have been reduced to elevations NGVD. Prior to Feb. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--The reservoir is formed by an earth/rockfill main dam and several earthfill dykes surrounding the storage area. Storage began Dec. 22, 1972. The fixed-crest concrete spillway was completed September 1973. The usable capacity of the reservoir is 23,300 acre-ft (28.7 hm^3) at spillway elevation 1,515 ft (461.8 m). Above elevation of 1,515 ft (461.8 m), water flows over concrete spillway into Middle Branch Escanaba River about 2,000 ft (610 m) below station 04057814. The main dam is equipped with an outlet structure with 4 valves to control flow to afterbay (conservation pool) which has a capacity of 420 acre-ft (518,000 m^3) at elevation 1,480 ft (451.1 m). Two outlet systems from the afterbay provide for diversion and release flow. Diverted flow to Green Creek gaged at Greenwood Diversion (station 04057813); released flow to Middle Branch Escanaba River gaged at Greenwood Release (station 04057814). Reservoir impounds water for diversion to Schweitzer Reservoir (station 04058190), for use in iron ore processing.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 25,400 acre-ft (31.3 hm^3) Apr. 26, 27, 1979, elevation, 1,516.5 ft (462.23 m); minimum since first filling, 3,240 acre-ft (3.99 hm^3) Mar. 12, 1977, elevation, 1,491.1 ft (454.49 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 24,560 acre-ft (30.3 hm^3) Apr. 22, elevation, 1,515.9 ft (462.05 m); minimum, 21,090 acre-ft (26.0 hm^3) Sept. 12, elevation, 1,513.3 ft (461.25 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft^3/s)
Sept. 30	1514.2	22,260	--	--
Oct. 31	1515.5	24,000	+1,740	+28.3
Nov. 30	1515.1	23,440	-560	-9.4
Dec. 31	1515.0	23,300	-140	-2.3
CAL YR 1979	--	--	+780	+1.1
Jan. 31	1514.8	23,040	-260	-4.2
Feb. 29	1514.1	22,130	-910	-15.8
Mar. 31	1513.4	21,220	-910	-14.8
Apr. 30	1515.5	24,000	+2,780	+46.7
May 31	1514.6	22,780	-1,220	-19.8
June 30	1514.6	22,780	0	0
July 31	1514.0	22,000	-780	-12.7
Aug. 31	1513.4	21,220	-780	-12.7
Sept. 30	1515.3	23,720	+2,500	+42.0
WTR YR 1980	--	--	+1,460	+2.0

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'32", long 87°48'02", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, in control house on downstream side of Greenwood Dam on the Middle Branch Escanaba River, 3.5 mi (5.6 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi² (174.6 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Jan. 31, 1973.

REMARKS.--Temperature recorder clock stopped Apr. 23 to May 6 (range in temperature 3.0 to 5.5°C), June 27 to July 1 (range in temperature 13.0 to 13.5°C). Flow regulated by the multi-port outlets of Greenwood Reservoir. Altitude of outlets are: (No.1) 1,505 ft (458.7 m), (No. 2) 1,495 ft (455.7 m), (No. 3) 1,485 ft (452.6 m), (No. 4) 1,478 ft (450.5 m) above mean sea level. Outlet No. 3 was open Oct. 1 to Sept. 30.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.5°C July 14, 15, 1974; minimum, 0.0°C on many days during January to March 1973.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 17.0°C Aug. 2-8, Sept. 10, 11; minimum, 2.5°C on many days during March and April.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	14.5	7.5	7.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
2	14.5	14.5	7.5	7.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
3	14.5	14.5	7.5	6.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
4	14.5	13.5	6.5	6.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
5	13.5	13.5	6.5	6.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
6	13.5	13.0	6.0	5.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
7	13.0	12.5	5.5	5.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
8	12.5	12.5	5.5	4.5	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
9	12.5	12.0	4.5	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
10	12.0	11.5	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
11	11.5	11.0	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
12	11.0	10.5	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
13	10.5	10.0	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
14	10.0	9.5	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	3.0
15	9.5	9.5	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	3.0	2.5
16	9.5	9.5	4.0	4.0	3.0	3.0	3.5	3.5	3.0	3.0	2.5	2.5
17	9.5	9.5	4.0	4.0	3.5	3.0	3.5	3.5	3.0	3.0	2.5	2.5
18	9.5	9.5	4.0	4.0	3.5	3.5	3.5	3.5	3.0	3.0	2.5	2.5
19	9.5	9.5	4.0	3.5	3.5	3.5	3.5	3.5	3.0	3.0	2.5	2.5
20	9.5	9.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	2.5	2.5
21	9.5	9.5	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	2.5	2.5
22	9.0	9.0	3.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	2.5
23	9.0	8.5	3.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0
24	8.5	8.5	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	3.0	2.5
25	8.5	8.0	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
26	8.0	8.0	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
27	8.0	8.0	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
28	8.0	8.0	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
29	8.0	8.0	3.5	3.0	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
30	8.0	8.0	3.0	3.0	3.5	3.5	3.0	3.0	---	---	2.5	2.5
31	8.0	7.5	---	---	3.5	3.5	3.0	3.0	---	---	2.5	2.5
MONTH	14.5	7.5	7.5	3.0	3.5	3.0	3.5	3.0	3.0	3.0	3.0	2.5

04057812 GREENWOOD AFTERBAY NEAR GREENWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	2.5	2.5	---	---	9.5	9.0	---	---	16.5	16.5	15.5	15.5
2	2.5	2.5	---	---	9.5	9.5	13.5	13.5	17.0	16.5	15.5	15.5
3	2.5	2.5	---	---	9.5	9.5	13.5	13.5	17.0	16.5	16.0	15.5
4	2.5	2.5	---	---	9.5	9.5	13.5	13.5	17.0	17.0	16.5	16.0
5	2.5	2.5	---	---	10.0	9.5	14.0	13.5	17.0	17.0	16.5	16.5
6	2.5	2.5	---	---	9.5	9.5	13.5	13.5	17.0	17.0	16.5	16.5
7	2.5	2.5	5.5	5.5	10.0	9.5	13.5	13.5	17.0	17.0	16.5	16.5
8	2.5	2.5	6.0	5.5	10.0	10.0	13.5	13.5	17.0	16.5	16.5	16.5
9	2.5	2.5	6.0	5.5	10.5	9.5	13.5	13.5	16.5	16.0	16.5	16.0
10	2.5	2.5	6.0	6.0	11.5	10.5	13.5	13.5	16.0	16.0	17.0	16.5
11	2.5	2.5	8.0	5.5	11.5	11.0	14.5	14.0	16.0	16.0	17.0	16.5
12	2.5	2.5	7.5	5.5	11.5	11.0	14.5	14.0	16.0	16.0	16.5	16.5
13	2.5	2.5	6.5	6.0	12.0	11.5	14.5	14.5	16.0	15.5	16.5	16.5
14	2.5	2.5	7.5	7.0	12.0	11.5	14.5	14.5	15.5	15.5	16.5	16.5
15	2.5	2.5	8.0	7.5	12.5	12.0	14.5	14.5	15.5	15.5	16.5	16.0
16	2.5	2.5	8.0	7.5	12.5	12.0	14.5	14.5	15.5	15.5	16.5	16.0
17	2.5	2.5	8.0	7.5	12.5	12.5	14.5	14.5	15.5	15.5	16.5	15.5
18	2.5	2.5	8.0	7.5	12.5	12.5	15.0	14.5	16.0	15.5	15.5	15.5
19	2.5	2.5	8.0	8.0	13.0	12.5	15.0	14.5	15.5	15.5	15.5	15.0
20	2.5	2.5	8.5	8.0	13.0	13.0	15.0	15.0	15.5	15.5	15.0	15.0
21	2.5	2.5	8.5	8.0	13.5	13.0	15.0	14.5	15.5	15.5	15.0	14.5
22	3.0	2.5	8.5	8.0	13.0	13.0	15.0	15.0	15.5	15.5	14.5	14.5
23	---	---	8.5	8.5	13.0	13.0	15.0	15.0	15.5	15.5	14.5	14.0
24	---	---	8.5	8.5	13.0	13.0	15.5	15.0	16.0	15.5	14.0	14.0
25	---	---	8.5	8.5	13.0	13.0	15.5	15.5	16.0	15.5	14.0	13.5
26	---	---	8.5	8.5	13.0	13.0	15.5	15.5	15.5	15.5	13.5	13.5
27	---	---	8.5	8.5	---	---	15.5	15.5	15.5	15.5	13.5	13.0
28	---	---	9.0	8.5	---	---	16.0	15.5	15.5	15.5	13.0	13.0
29	---	---	9.0	9.0	---	---	16.0	16.0	15.5	15.5	13.0	13.0
30	---	---	9.0	9.0	---	---	16.5	16.5	15.5	15.5	13.0	13.0
31	---	---	9.0	9.0	---	---	16.5	16.5	15.5	15.5	---	---
MONTH									17.0	15.5	17.0	13.0

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'04", long 87°46'10", in NW¼ NE¼ sec.35, T.47 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on left bank at downstream end of pipeline, 200 ft (61 m) upstream from Green Creek, 0.7 mi (1.1 km) downstream from Greenwood Afterbay, and 3.6 mi (5.8 km) south of Greenwood.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--December 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,460 ft (445 m) from topographic map (nearest 10 ft). Prior to Aug. 22, 1973, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records excellent. Flow completely regulated. A pipeline, 0.7 mi (1.1 km) long,, diverts water from Greenwood Reservoir (station 04057811) into Green Creek, tributary to Schweitzer Reservoir (station 04058190). Water is used for iron ore processing, some returned to Middle Branch Escanaba River via another Green Creek (tributary to Middle Branch Escanaba River) 27 mi (43 km) below station and some returned to the East Branch Escanaba River via Goose Lake Outlet.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 30 ft³/s (0.85 m³/s) June 25-28, 1977, Nov. 9, 1979; no flow Dec. 27, 1972 to Jan. 6, 1973.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	13	12	21	18	18	17	17	27	23	24	.66
2	27	13	12	21	18	18	17	17	27	23	24	2.6
3	26	12	12	21	18	18	17	16	27	23	24	3.7
4	26	12	12	20	18	18	17	16	26	23	24	2.7
5	26	12	12	17	18	18	17	16	26	24	24	2.7
6	26	12	12	17	18	18	17	16	26	24	18	2.7
7	26	12	12	18	18	18	17	16	26	24	9.5	2.7
8	26	12	12	18	18	18	17	15	26	24	3.3	2.7
9	25	12	12	18	18	18	17	15	26	23	.60	2.7
10	25	12	12	18	18	18	17	15	26	23	.63	2.7
11	25	12	12	18	18	18	17	15	26	23	.65	2.7
12	25	12	12	18	18	18	17	16	26	23	.66	2.7
13	26	12	12	18	18	18	17	21	27	23	.66	2.7
14	26	14	12	18	18	18	17	26	27	24	.66	2.7
15	25	17	13	18	18	17	17	27	27	24	.66	2.7
16	25	17	13	18	18	17	17	27	27	24	.66	2.7
17	25	17	13	18	18	17	17	27	27	24	.66	2.7
18	25	17	13	18	18	17	17	27	27	24	.66	2.7
19	25	17	13	18	18	17	17	27	27	24	.66	2.7
20	25	17	13	18	18	17	17	27	26	24	.66	2.7
21	26	17	14	18	18	17	17	28	25	24	.66	2.8
22	26	17	17	18	18	17	17	28	25	24	.66	2.8
23	24	17	17	18	18	17	18	28	25	24	.66	2.8
24	19	17	17	18	18	17	18	28	24	24	.66	2.8
25	19	17	17	17	18	17	18	28	24	24	.66	2.8
26	19	15	17	17	18	17	18	28	24	24	.66	2.8
27	19	12	17	17	18	17	18	28	23	24	.66	2.8
28	19	12	17	17	18	17	18	28	23	24	.66	2.8
29	17	12	17	17	18	17	18	28	23	24	.66	2.8
30	13	12	17	17	---	17	17	27	23	24	.66	2.8
31	13	---	18	18	---	17	---	26	---	24	.66	---
TOTAL	728	422	431	561	522	541	517	704	769	735	165.88	80.86
MEAN	23.5	14.1	13.9	18.1	18.0	17.5	17.2	22.7	25.6	23.7	5.35	2.70
MAX	29	17	18	21	18	18	18	28	27	24	24	3.7
MIN	13	12	12	17	18	17	17	15	23	23	.60	.66

CAL YR 1979 TOTAL 5794.80 MEAN 15.9 MAX 29 MIN 5.6
WTR YR 1980 TOTAL 6176.74 MEAN 16.9 MAX 29 MIN .60

04057813 GREENWOOD DIVERSION NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 31, 1973.

REMARKS.--Temperature recorder clock stopped Feb. 16 to Mar. 4 (range in temperature 2.5 to 3.0°C). Flow regulated by inlet structure of pipeline from Greenwood Afterbay 0.7 mi (1.1 km) upstream.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 22.5°C July 18, 19, 1974; minimum, 0.5°C on many days during winter periods 1977, 1978.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 18.5°C Aug. 6; minimum, 2.0°C Mar. 19, 20.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.0	14.5	6.5	6.5	4.5	4.5	3.0	3.0	2.5	2.5	---	---
2	14.5	14.5	6.5	6.5	4.5	4.0	3.0	3.0	2.5	2.5	---	---
3	14.5	14.0	6.5	6.5	4.0	4.0	3.0	3.0	2.5	2.5	---	---
4	14.0	13.5	6.5	6.0	4.0	3.5	3.0	3.0	2.5	2.5	---	2.5
5	13.5	12.5	6.0	6.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
6	12.5	12.5	6.0	5.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
7	12.5	11.5	5.0	5.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
8	11.5	11.0	5.0	4.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
9	11.0	10.5	4.0	4.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
10	10.5	10.0	4.0	4.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
11	10.0	9.5	4.5	4.0	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
12	9.5	8.5	4.5	4.5	3.5	3.5	3.0	3.0	2.5	2.5	2.5	2.5
13	8.5	8.0	4.5	4.5	3.5	3.5	3.0	3.0	3.0	2.5	2.5	2.5
14	8.0	8.0	4.5	4.5	3.5	3.5	3.0	3.0	3.0	3.0	2.5	2.5
15	8.0	7.5	4.5	4.5	3.5	3.5	3.0	3.0	3.0	2.5	2.5	2.5
16	7.5	7.5	4.5	4.5	3.5	3.5	3.0	3.0	---	---	2.5	2.5
17	8.5	7.5	4.5	4.0	3.5	3.5	3.0	3.0	---	---	2.5	2.5
18	9.0	8.5	4.0	4.0	3.5	3.5	3.0	3.0	---	---	2.5	2.5
19	9.0	9.0	4.0	4.0	3.5	3.0	3.0	3.0	---	---	2.5	2.0
20	9.0	9.0	4.5	4.0	3.0	3.0	3.0	3.0	---	---	2.5	2.0
21	10.0	9.5	4.5	4.5	3.0	3.0	3.0	3.0	---	---	2.5	2.5
22	10.5	10.0	4.5	4.5	3.0	3.0	3.0	3.0	---	---	2.5	2.5
23	10.5	9.0	4.5	4.5	3.0	3.0	3.0	3.0	---	---	2.5	2.5
24	9.0	8.0	4.5	4.5	3.0	3.0	3.0	3.0	---	---	2.5	2.5
25	8.0	7.0	4.5	4.5	3.0	3.0	3.0	2.5	---	---	2.5	2.5
26	7.0	6.5	4.5	4.5	3.0	3.0	2.5	2.5	---	---	2.5	2.5
27	6.5	6.5	4.5	4.5	3.0	3.0	2.5	2.5	---	---	2.5	2.5
28	6.5	6.0	4.5	4.5	3.0	3.0	2.5	2.5	---	---	2.5	2.5
29	6.0	6.0	4.5	4.5	3.0	3.0	2.5	2.5	---	---	2.5	2.5
30	6.0	6.0	4.5	4.5	3.0	3.0	2.5	2.5	---	---	3.0	2.5
31	6.5	6.0	---	---	3.0	3.0	2.5	2.5	---	---	3.0	3.0
MONTH	15.0	6.0	6.5	4.0	4.5	3.0	3.0	2.5				

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.0	3.0	7.5	7.0	12.5	12.5	15.5	15.0	17.5	17.5	16.0	16.0
2	3.0	3.0	8.0	7.5	12.5	12.0	16.0	15.5	18.0	17.5	16.0	16.0
3	3.5	3.0	8.5	8.0	12.5	12.0	16.0	16.0	18.0	18.0	16.0	16.0
4	3.5	3.5	9.0	8.5	12.5	12.5	16.5	16.0	18.0	18.0	16.5	16.0
5	3.5	3.0	9.5	9.0	13.0	12.5	17.0	16.5	18.0	18.0	16.5	16.5
6	3.5	3.0	10.5	9.5	13.0	12.5	16.5	15.5	18.5	18.0	16.5	16.5
7	4.0	3.5	11.0	9.0	13.5	12.5	16.5	15.5	18.0	18.0	16.5	16.5
8	4.0	4.0	9.0	8.0	13.5	12.0	17.0	16.5	18.0	18.0	16.5	16.0
9	4.0	4.0	8.0	7.5	12.5	12.0	17.0	17.0	18.0	17.5	16.0	16.0
10	4.0	3.5	8.0	7.5	14.0	12.5	17.0	17.0	17.5	17.0	16.0	16.0
11	3.5	3.5	9.5	8.0	13.0	12.5	17.5	17.0	17.0	17.0	16.0	16.0
12	3.5	3.5	9.0	8.5	13.0	12.5	17.5	17.5	17.0	17.0	16.0	16.0
13	3.5	3.5	9.5	9.0	14.0	13.0	17.5	17.5	17.0	17.0	16.0	16.0
14	3.5	3.5	9.0	9.0	14.5	13.5	17.5	17.0	17.0	17.0	16.0	16.0
15	3.5	3.0	9.0	9.0	14.0	13.5	17.5	17.0	17.0	17.0	15.5	15.0
16	3.0	3.0	9.5	9.0	14.0	13.5	18.0	17.5	17.0	17.0	15.0	15.0
17	3.0	3.0	10.0	9.5	14.0	14.0	18.0	17.5	17.0	16.5	15.0	14.0
18	3.5	3.0	11.0	10.0	15.0	14.0	17.5	17.5	16.5	16.5	14.0	13.5
19	4.0	3.5	11.0	10.5	15.0	14.5	17.5	17.0	16.5	16.5	13.5	13.0
20	4.0	4.0	11.0	11.0	14.5	14.5	18.0	17.0	16.5	16.5	13.0	12.5
21	4.0	4.0	11.5	11.0	15.0	14.5	17.5	17.0	16.5	16.5	12.5	12.5
22	8.0	4.0	12.0	11.5	15.5	15.0	17.5	17.0	16.5	16.5	12.5	12.0
23	8.0	7.5	12.5	11.5	15.5	15.0	17.5	17.5	16.5	16.5	12.0	11.5
24	7.5	7.0	12.5	12.0	16.0	15.5	17.5	17.5	16.5	16.5	11.5	11.0
25	7.0	7.0	12.5	12.0	16.5	16.0	18.0	17.5	16.5	16.5	11.0	11.0
26	7.0	7.0	13.0	12.0	16.5	16.5	18.0	17.0	16.5	16.5	11.0	10.5
27	7.5	7.0	12.5	12.0	16.5	16.0	17.5	17.0	16.5	16.5	10.5	10.5
28	7.5	7.5	12.5	12.0	16.0	15.5	17.5	17.0	16.5	16.5	10.5	10.0
29	7.5	7.5	12.5	12.0	15.5	15.5	17.5	17.5	16.5	16.5	10.0	10.0
30	7.5	7.0	12.5	12.5	15.5	15.0	18.0	17.5	16.0	16.0	10.0	10.0
31	---	---	12.5	12.0	---	---	17.5	17.5	16.0	16.0	---	---
MONTH	8.0	3.0	13.0	7.0	16.5	12.0	18.0	15.0	18.5	16.0	16.5	10.0

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI

LOCATION.--Lat 46°26'22", long 87°47'52", in NW¼ SW¼ sec.27, T.47 N., R.28 W., Marquette County, Hydrologic Unit [illegible]030110, on left bank at outlet of Greenwood Afterbay releasing to Middle Branch Escanaba River, 2.6 mi (4.2 km) upstream from Bell Creek and 3.8 mi (6.1 km) southwest of Greenwood.

DRAINAGE AREA.--67.4 mi^2 (174.6 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1972 to current year.

GAGE.--Water-stage recorder and concrete flume. Altitude of gage is 1,480 ft (451 m) from topographic map (nearest 10 ft). Prior to Nov. 7, 1973, nonrecording gage at same site and different datum.

REMARKS.--Water-discharge records good. Since December 1972, flow from Greenwood Reservoir (station 04057811) below spillway elevation 1,515 ft (462 m) is completely regulated by the afterbay release structure into the Middle Branch Escanaba River. Since January 1973, water is diverted immediately above this station (station 04057813) to Green Creek for iron ore processing, some returned via another Green Creek to Middle Branch Escanaba River 27 mi (43 km) downstream and some returned to the East Branch Escanaba River via Goose Lake Outlet. Overflow from the reservoir spillway bypasses and returns to the Middle Branch Escanaba River 0.5 mi (0.8 km) downstream from this station.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge (prior to regulation), 290 ft^3/s (8.21 m^3/s) Oct. 1, 1972; (since regulation began), 63 ft^3/s (1.78 m^3/s) July 10, 11, 1974; minimum daily, 10 ft^3/s (0.28 m^3/s) Dec. 29, 30, 1972, result of construction.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	28	26	25	25	25	25	26	26	25	25	25
2	28	27	27	25	25	25	25	26	26	25	25	25
3	27	26	27	25	25	25	25	26	26	25	25	24
4	27	26	27	25	25	25	25	26	26	26	25	25
5	27	26	27	25	26	25	25	25	26	26	26	25
6	27	25	27	26	26	25	25	24	25	26	25	25
7	27	26	[illegible]	26	26	25	25	24	25	26	26	25
8	27	26	26	26	26	25	25	23	25	26	26	25
9	27	26	26	26	26	25	25	23	25	26	24	25
10	27	26	26	26	26	25	25	23	25	25	25	25
11	27	26	26	26	25	25	25	22	25	25	26	25
12	27	26	26	27	25	25	25	22	25	25	26	25
13	27	26	26	27	26	25	25	24	25	25	26	26
14	27	26	26	27	25	25	25	26	26	26	26	26
15	27	26	26	26	25	25	25	24	26	26	26	26
16	27	26	26	26	25	25	25	24	26	26	26	26
17	27	26	26	26	25	25	25	24	26	25	26	26
18	27	26	26	26	25	25	25	24	26	25	26	26
19	27	26	26	26	25	25	25	24	26	25	26	26
20	27	26	26	26	25	25	25	25	26	26	26	26
21	27	26	26	26	25	25	25	26	26	26	26	26
22	27	26	26	26	25	25	26	26	26	26	26	26
23	28	26	26	26	25	25	27	26	26	26	26	26
24	28	26	25	26	25	25	27	26	26	25	26	26
25	28	26	25	26	25	25	27	26	25	26	26	26
26	28	26	25	25	25	25	28	26	25	25	26	26
27	28	26	25	25	25	25	28	26	25	25	26	26
28	28	26	25	25	25	25	28	26	25	25	25	26
29	28	26	25	25	25	25	27	26	25	25	25	26
30	28	26	25	25	---	25	27	26	25	25	25	26
31	28	---	25	25	---	25	---	26	---	25	25	---
TOTAL	848	782	804	798	733	775	770	771	766	789	794	767
MEAN	27.4	26.1	25.9	25.7	25.3	25.0	25.7	24.9	25.5	25.5	25.6	25.6
MAX	28	28	27	27	26	25	28	26	26	26	26	26
MIN	27	25	25	25	25	25	25	22	25	25	24	24

CAL YR 1979 TOTAL 10039 MEAN 27.5 MAX 37 MIN 21
WTR YR 1980 TOTAL 9397 MEAN 25.7 MAX 28 MIN 22

04057814 GREENWOOD RELEASE NEAR GREENWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: September 1973 to current year.

INSTRUMENTATION.--Temperature recorder since Sept. 1, 1973.

REMARKS.--Temperature recorder clock stopped May 2-7 (range in temperature 5.5 to 10.0°C). Flow regulated by valve at outlet of Greenwood Afterbay.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 23.5°C July 14, 15, 1974; minimum, 0.0°C Mar. 24, 25, 1979.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5°C Aug. 8, 9, 21; minimum, 2.0°C Nov. 28 to Dec. 1, Feb. 4 to Mar. 1, Apr. 9.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.0	14.5	7.0	6.5	2.5	2.0	3.5	3.5	2.5	2.5	2.5	2.0
2	14.5	14.5	6.5	5.5	2.5	2.5	3.5	3.0	2.5	2.5	2.5	2.5
3	14.5	14.0	5.5	5.5	2.5	2.5	3.5	3.0	2.5	2.5	2.5	2.5
4	14.0	13.5	5.5	5.0	3.0	2.5	3.0	3.0	2.5	2.0	2.5	2.5
5	13.5	13.0	5.5	5.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
6	13.5	12.5	5.5	4.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
7	12.5	12.0	4.5	4.0	3.0	3.0	3.0	2.5	2.0	2.0	2.5	2.5
8	12.0	12.0	4.5	3.5	3.0	3.0	3.0	2.5	2.0	2.0	2.5	2.5
9	12.0	11.5	3.5	3.5	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
10	11.5	10.5	3.5	3.0	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
11	11.0	10.5	3.5	3.0	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
12	10.5	9.0	3.5	3.5	3.0	3.0	3.5	3.0	2.0	2.0	2.5	2.5
13	9.5	8.5	3.5	3.5	3.0	3.0	3.5	3.0	2.0	2.0	2.5	2.5
14	9.5	9.0	3.5	3.5	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
15	9.5	9.0	3.5	3.5	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
16	9.5	9.0	3.5	3.0	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
17	10.0	9.0	3.5	3.0	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
18	9.5	8.5	3.5	3.5	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
19	10.5	9.5	3.5	3.5	3.0	3.0	3.5	3.5	2.0	2.0	2.5	2.5
20	10.5	10.0	3.5	3.0	3.0	3.0	3.5	3.0	2.0	2.0	2.5	2.5
21	10.5	10.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.5	2.5
22	10.5	9.5	3.0	3.0	3.5	3.0	3.0	3.0	2.0	2.0	3.0	2.5
23	9.5	8.0	3.0	3.0	3.5	3.5	3.0	2.5	2.0	2.0	3.0	2.5
24	8.0	8.0	3.0	3.0	3.5	3.5	2.5	2.5	2.0	2.0	2.5	2.5
25	8.0	7.5	3.0	3.0	3.5	3.5	2.5	2.5	2.0	2.0	3.0	2.5
26	7.5	7.5	3.0	2.5	3.5	3.5	2.5	2.5	2.0	2.0	3.0	2.5
27	7.5	7.5	2.5	2.5	3.5	3.5	2.5	2.5	2.0	2.0	3.0	2.5
28	7.5	7.0	2.5	2.0	3.5	3.5	2.5	2.5	2.0	2.0	3.0	2.5
29	7.0	7.0	2.0	2.0	3.5	3.5	2.5	2.5	2.0	2.0	3.5	2.5
30	7.0	6.5	2.0	2.0	3.5	3.5	2.5	2.5	---	---	3.5	2.5
31	6.5	6.5	---	---	3.5	3.5	2.5	2.5	---	---	3.5	2.5
MONTH	15.0	6.5	7.0	2.0	3.5	2.0	3.5	2.5	2.5	2.0	3.5	2.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	2.5	8.5	6.0	11.0	10.5	17.0	14.5	18.5	16.0	17.0	16.5
2	4.0	2.5	---	6.5	13.0	11.0	17.5	14.0	19.0	16.5	18.0	16.0
3	3.5	2.5	---	---	13.0	10.5	18.0	14.0	18.5	16.0	17.0	16.0
4	4.0	2.5	---	---	13.0	10.5	16.5	14.5	17.0	16.0	18.0	16.0
5	4.5	2.5	---	---	12.5	11.0	15.0	14.5	18.5	16.5	18.0	16.5
6	4.0	2.5	---	---	14.5	11.0	16.0	14.0	19.0	16.0	19.0	16.5
7	3.0	2.5	6.5	---	12.5	11.0	17.0	15.0	20.0	17.0	18.5	16.5
8	3.0	2.5	6.5	5.5	12.0	10.0	18.0	14.5	20.5	17.0	18.5	17.5
9	2.5	2.0	7.5	6.0	13.5	10.5	18.0	15.0	20.5	17.5	19.5	17.5
10	3.0	2.5	7.0	6.0	13.5	10.5	18.0	15.0	18.0	16.0	18.5	16.5
11	3.0	2.5	9.0	6.5	15.5	11.5	17.0	15.0	18.5	16.5	18.5	16.5
12	3.0	2.5	9.0	6.5	14.5	12.0	17.0	15.0	18.5	16.0	17.5	17.0
13	3.0	2.5	9.5	7.0	15.0	13.0	17.0	15.0	17.5	16.5	17.0	16.5
14	2.5	2.5	8.5	7.0	13.5	13.0	16.5	15.0	18.5	17.0	17.0	16.0
15	3.0	2.5	12.0	8.0	15.0	12.0	18.5	15.0	18.0	16.5	16.0	16.0
16	4.0	2.5	10.0	8.5	16.0	12.0	17.5	15.0	17.5	16.0	16.0	16.0
17	5.0	3.0	10.5	8.5	16.0	13.0	17.0	15.0	17.5	16.5	16.5	15.5
18	6.0	3.0	13.0	9.0	15.5	14.0	16.0	15.0	19.0	16.5	16.0	15.0
19	5.0	3.5	12.5	9.0	17.0	14.0	18.0	15.0	18.0	16.5	15.0	15.0
20	6.0	3.5	13.0	9.0	17.0	14.0	16.5	15.0	17.0	17.0	15.0	15.0
21	5.5	3.5	12.5	9.5	16.0	14.5	17.5	15.0	20.5	16.5	15.0	14.5
22	6.5	4.5	13.0	9.5	16.5	14.5	17.0	15.0	19.0	16.5	15.0	14.5
23	6.0	4.0	12.0	9.5	17.0	14.5	18.0	15.0	19.0	16.5	14.5	14.0
24	4.0	3.0	12.5	10.0	16.5	14.5	17.5	15.0	17.5	16.0	14.5	14.0
25	5.0	3.5	12.0	10.0	17.5	15.0	17.0	15.5	18.0	16.0	14.0	13.5
26	5.0	4.5	12.0	9.5	17.5	14.5	17.0	15.0	18.0	17.0	14.0	13.0
27	7.5	4.5	12.0	10.0	15.5	14.0	17.5	15.0	19.0	16.5	14.0	13.0
28	5.5	5.0	12.0	10.0	16.5	14.0	17.5	15.5	17.5	16.0	13.5	12.5
29	6.0	5.5	12.0	10.0	15.5	14.0	19.0	15.5	17.0	16.0	15.0	13.0
30	7.5	5.5	12.0	10.5	16.5	14.0	17.0	15.5	18.0	16.5	15.0	14.0
31	---	---	11.5	10.5	---	---	17.5	16.0	17.0	16.0	---	---
MONTH	7.5	2.0			17.5	10.0	19.0	14.0	20.5	16.0	19.5	12.5

04057820 MIDDLE BRANCH ESCANABA RIVER NEAR GREENWOOD, MI

LOCATION.--Lat 46°25'12", long 87°47'50", in NW¼ sec.3, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) downstream from county highway bridge, 100 ft (30 m) downstream from Bell Creek and 5.0 mi (8.0 km) southwest of Greenwood.

DRAINAGE AREA.--73.3 mi^2 (189.8 km^2).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-72, and annual maximum, water years 1970-72, October 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,400 ft (427 m) from topographic map (nearest 10 ft). Oct. 2, 1960 to Sept. 20, 1973, nonrecording gage and Sept. 11, 1969 to Sept. 20, 1973, crest-stage gage at present site and datum.

REMARKS.--Records good except those for winter period, which are fair. Since December 1972, considerable regulation 2.1 mi (3.4 km) upstream (station 04057814) and 2.6 mi (4.2 km) upstream (station 04057811). Since January 1973, flow diverted 2.3 mi (3.7 km) upstream at Greenwood Afterbay, to Green Creek (station 04057813) for iron ore processing, some returned to Middle Branch Escanaba River 24 mi (39 km) downstream via another Green Creek and some returned to East Branch Escanaba River via Goose Lake Outlet. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 84.7 ft^3/s (2.399 m^3/s), 15.69 in/yr (399 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,130 ft^3/s (32.0 m^3/s) Apr. 26, 1979, gage height, 13.40 ft (4.084 m); minimum observed, 8.62 ft^3/s (0.24 m^3/s) Aug. 22, 1962, discharge measurement; minimum daily, 12 ft^3/s (0.34 m^3/s) Dec. 28, 1972, Jan. 2-4, Nov. 5, 1973, result of construction upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 399 ft^3/s (11.3 m^3/s) Apr. 23, gage height, 10.35 ft (3.155 m); minimum daily, 23 ft^3/s (0.65 m^3/s) Aug. 10.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	220	51	31	32	30	32	129	30	24	24	26
2	29	249	49	31	32	30	32	114	30	24	24	26
3	29	268	47	31	32	30	33	100	29	24	24	26
4	29	234	46	31	32	30	32	90	27	24	24	26
5	29	195	45	31	32	30	32	80	26	24	26	26
6	29	169	45	31	32	30	34	72	26	24	25	26
7	29	135	45	31	32	30	35	67	32	27	25	25
8	28	121	45	31	32	29	36	61	37	26	24	26
9	28	99	45	31	31	29	37	56	37	25	24	27
10	28	90	45	31	31	29	37	54	44	24	23	26
11	28	75	43	31	30	29	37	55	45	24	24	25
12	29	70	42	31	30	29	58	50	40	24	24	27
13	30	64	40	31	30	29	87	45	35	24	24	34
14	30	59	40	31	30	29	98	39	48	26	25	41
15	30	56	39	32	30	29	96	34	50	26	25	34
16	30	53	37	32	30	29	89	31	46	25	24	31
17	30	52	36	32	30	29	84	29	39	26	24	29
18	30	51	35	32	30	29	106	27	32	25	24	29
19	30	50	35	32	30	29	147	26	28	25	24	30
20	30	51	34	32	30	29	209	26	26	26	24	29
21	31	55	34	32	30	29	279	26	26	26	24	43
22	44	60	34	32	30	30	350	26	26	26	24	68
23	52	59	34	32	30	30	394	26	26	25	24	131
24	44	57	34	32	30	30	379	26	25	26	25	151
25	127	54	34	32	30	30	329	26	24	26	25	160
26	207	57	33	32	30	30	274	26	24	26	25	152
27	208	60	32	32	30	30	231	26	24	25	25	151
28	188	56	32	32	30	30	194	26	24	25	25	135
29	178	55	32	32	30	30	169	26	24	25	25	115
30	176	52	32	32	---	30	148	26	24	24	25	105
31	171	---	32	32	---	31	---	30	---	24	25	---
TOTAL	2010	2926	1207	978	888	917	4098	1475	954	775	757	1780
MEAN	64.8	97.5	38.9	31.5	30.6	29.6	137	47.6	31.8	25.0	24.4	59.3
MAX	208	268	51	32	32	31	394	129	50	27	26	160
MIN	28	50	32	31	30	29	32	26	24	24	23	25

CAL YR 1979 TOTAL 36529 MEAN 100 MAX 1110 MIN 28 MEAN+ 117 CFSM+ 1.60 IN+ 21.67
WTR YR 1980 TOTAL 18765 MEAN 51.3 MAX 394 MIN 23 MEAN+ 70.2 CFSM+ 0.96 IN+ 13.04

+ Adjusted for diversion and change in contents in Greenwood Reservoir.

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI

LOCATION.--Lat 46°23'40", long 87°45'30", in NW¼ SW¼ sec.12, T.46 N., R.28 W., Marquette County, Hydrologic Unit 04030110, at former gaging station on left bank 0.5 mi (0.8 km) downstream from County Highway 581, 6 mi (10 km) southwest of Ishpeming, and 10 mi (16 km) east of Republic.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1961 to September 1975, October 1976 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 24, 1961.

REMARKS.--Temperature recorder clock stopped Apr. 16 to May 7 (range in temperature 3.0 to 8.5°C). Complete ice cover during winter period. Some regulation and diversion 6 mi (10 km) upstream since December 1972.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 22.0°C June 25, 26, July 10-12, 15, 16; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.0	12.0	6.0	6.0	1.0	1.0	.5	.0	.0	.0	.0	.0
2	12.0	12.0	6.0	5.5	1.0	1.0	.0	.0	.0	.0	.0	.0
3	12.0	12.0	5.5	5.0	1.0	1.0	.0	.0	.0	.0	.0	.0
4	12.0	11.0	5.0	5.0	1.0	.5	.0	.0	.0	.0	.0	.0
5	11.0	10.0	5.0	5.0	1.0	1.0	.0	.0	.0	.0	.0	.0
6	10.0	10.0	5.0	4.5	1.0	1.0	.0	.0	.0	.0	.0	.0
7	10.0	9.5	4.5	4.0	1.0	1.0	.0	.0	.0	.0	.0	.0
8	9.5	9.5	4.0	3.0	1.0	1.0	.0	.0	.0	.0	.0	.0
9	9.5	8.5	3.0	2.5	1.0	1.0	.0	.0	.0	.0	.0	.0
10	8.5	8.0	2.5	2.0	1.0	1.0	.0	.0	.0	.0	.0	.0
11	8.0	8.0	2.0	1.5	1.0	1.0	.0	.0	.0	.0	.5	.5
12	8.0	7.0	1.5	1.5	1.0	1.0	.0	.0	.0	.0	.5	.5
13	7.0	6.0	1.5	1.5	1.0	.5	.0	.0	.0	.0	.5	.5
14	6.0	6.0	1.5	1.5	.5	.5	.0	.0	.0	.0	.5	.5
15	7.0	6.0	1.5	1.5	.5	.5	.0	.0	.0	.0	.5	.5
16	7.0	7.0	1.5	1.5	.5	.5	.0	.0	.0	.0	.5	.5
17	7.5	7.0	1.5	1.5	.5	.5	.0	.0	.0	.0	.5	.5
18	7.5	6.5	1.5	1.5	.5	.5	.0	.0	.0	.0	.5	.5
19	8.5	7.0	2.0	1.5	.5	.5	.0	.0	.0	.0	.5	.5
20	9.5	8.5	2.0	2.0	.5	.5	.0	.0	.0	.0	.5	.5
21	10.0	9.5	2.0	2.0	.5	.5	.0	.0	.0	.0	.5	.5
22	10.0	8.5	2.0	2.0	.5	.5	.0	.0	.0	.0	1.0	.5
23	8.5	5.5	2.0	2.0	.5	.5	.0	.0	.0	.0	1.5	1.5
24	5.5	5.0	2.0	2.0	.5	.5	.0	.0	.0	.0	1.5	1.5
25	5.0	4.5	2.0	1.5	.5	.5	.0	.0	.0	.0	2.5	1.5
26	5.0	4.5	1.5	1.5	.5	.5	.0	.0	.0	.0	3.0	2.0
27	5.0	5.0	1.5	1.5	.5	.5	.0	.0	.0	.0	3.0	2.5
28	5.0	5.0	1.5	1.5	.5	.5	.0	.0	.0	.0	3.5	2.5
29	5.0	5.0	1.5	1.5	.5	.5	.0	.0	.0	.0	3.0	2.5
30	5.5	5.0	1.5	1.0	.5	.5	.0	.0	---	---	3.0	2.5
31	5.5	5.0	---	---	.5	.5	.0	.0	---	---	3.0	2.5
MONTH	13.0	4.5	6.0	1.0	1.0	.5	.5	.0	.0	.0	3.5	.0

04058000 MIDDLE BRANCH ESCANABA RIVER NEAR ISHPEMING, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.0	2.5	---	---	14.5	13.0	18.5	17.0	19.5	17.0	15.5	15.5
2	3.0	2.5	---	---	13.5	12.5	19.0	16.0	19.5	18.0	16.0	15.0
3	3.0	2.0	---	---	14.0	12.5	20.5	16.5	19.5	17.0	16.0	15.0
4	3.0	2.0	---	---	15.0	12.5	20.5	18.0	19.0	17.0	16.5	15.0
5	3.5	3.0	---	---	15.0	13.5	19.5	17.0	18.5	16.5	16.5	15.0
6	3.5	3.0	---	---	16.0	13.0	19.0	15.0	19.5	17.0	15.5	14.0
7	3.0	3.0	---	---	16.0	14.0	20.5	17.0	20.5	18.5	16.5	14.5
8	2.5	2.0	9.0	8.0	14.0	12.5	20.5	19.0	20.5	19.5	17.0	15.0
9	2.0	2.0	9.0	8.0	13.0	12.0	21.0	19.5	20.5	17.5	17.0	16.0
10	2.0	2.0	9.0	8.0	13.0	12.0	22.0	19.5	19.0	17.5	15.5	13.5
11	2.5	2.0	9.5	8.5	14.5	12.0	22.0	20.0	19.0	18.0	14.5	14.0
12	3.0	2.5	10.5	8.0	15.5	13.5	22.0	19.0	18.5	17.0	14.5	14.0
13	3.0	2.5	11.0	9.5	17.0	15.5	21.0	19.0	18.5	17.5	14.0	14.0
14	2.5	2.5	10.5	9.5	17.0	15.5	20.0	19.5	18.0	17.5	14.0	13.5
15	3.0	2.5	11.5	8.5	15.5	14.0	22.0	20.0	18.0	16.5	13.5	12.5
16	---	---	13.5	9.5	16.0	13.5	22.0	21.0	17.5	15.5	12.5	12.5
17	---	---	13.5	11.5	16.5	14.5	21.5	20.0	17.5	17.5	12.5	11.0
18	---	---	14.5	12.5	16.5	15.5	21.5	19.0	18.5	16.5	11.0	10.5
19	---	---	14.5	12.5	16.0	14.0	20.0	17.5	18.5	17.5	10.5	10.0
20	---	---	15.5	12.5	17.0	14.5	20.0	18.5	17.5	17.5	10.0	10.0
21	---	---	16.5	13.5	17.0	16.0	19.0	17.5	19.5	17.5	10.0	10.0
22	---	---	17.5	14.5	18.0	15.5	19.0	18.0	19.5	17.0	10.0	10.0
23	---	---	17.5	14.5	19.0	16.5	19.5	17.0	19.0	17.0	10.0	10.0
24	---	---	17.5	14.5	20.5	17.5	20.5	17.5	19.0	17.0	10.0	10.0
25	---	---	17.5	14.5	22.0	19.0	20.5	19.5	18.0	17.0	10.0	10.0
26	---	---	16.0	13.0	22.0	19.5	19.5	17.0	18.0	18.0	10.0	10.0
27	---	---	15.5	13.5	20.0	16.0	19.0	16.0	18.0	17.5	10.0	9.5
28	---	---	17.0	14.0	17.0	15.0	19.0	17.5	18.0	16.5	9.5	9.0
29	---	---	17.0	14.5	17.0	16.0	19.5	17.0	17.0	16.5	10.5	9.5
30	---	---	16.0	15.0	17.0	15.0	19.5	17.5	17.0	17.0	10.5	10.5
31	---	---	15.0	14.0	---	---	19.0	17.5	17.0	15.0	---	---
MONTH					22.0	12.0	22.0	15.0	20.5	15.0	17.0	9.0

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI

LOCATION.--Lat 46°19'02", long 87°30'07", in NW¼ sec.12, T.45 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 400 ft (122 m) downstream from powerplant, 0.3 mi (0.5 km) upstream from Green Creek, and 2.2 mi (3.5 km) northwest of Princeton.

DRAINAGE AREA.--210 mi² (544 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--July 1961 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,100 ft (335 m) from topographic map (nearest 20 ft).

REMARKS.--Water-discharge records good. Flow regulated by powerplant above station. Since December 1972, additional regulation 27 mi (43 km) upstream (station 04057814). Since January 1973, flow diverted to Green Creek 27 mi (43 km) upstream (station 04057813) by industry for iron ore processing, some returned via another Green Creek 0.3 mi (0.5 km) downstream and some returned to East Branch Escanaba River via Goose Lake Outlet.

AVERAGE DISCHARGE.--19 years, 223 ft³/s (6.315 m³/s), 14.42 in/yr (366 mm/yr), adjusted for storage and diversion since December 1972.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,580 ft³/s (73.1 m³/s) May 6, 1972, gage height, 7.85 ft (2.393 m); maximum gage height, 8.37 ft (2.551 m) Apr. 27, 1979; minimum discharge recorded, 2.2 ft³/s (0.062 m³/s) Oct. 5, 1964; minimum daily, 4.1 ft³/s (0.12 m³/s) Feb. 4, 1967.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 25 and 26, 1960, reached a stage of 10.5 ft (3.20 m) from floodmark, discharge, 3,850 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 770 ft³/s (21.8 m³/s) Oct. 23, gage height, 3.98 ft (1.213 m); minimum, 8.6 ft³/s (0.24 m³/s) Oct. 1; minimum gage height, 0.71 ft (0.216 m) Nov. 26; minimum daily discharge, 72 ft³/s (2.04 m³/s) May 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	89	536	224	115	146	112	225	389	84	89	97	106
2	92	590	224	115	136	114	242	357	312	96	97	106
3	93	623	204	115	134	113	243	317	173	110	97	108
4	119	611	174	115	134	115	244	316	91	97	97	118
5	120	545	174	115	134	115	248	261	165	97	98	136
6	101	503	198	116	134	115	289	203	148	97	131	136
7	101	461	215	118	134	115	382	203	106	97	165	133
8	96	352	194	119	134	115	465	203	125	97	145	131
9	99	412	194	114	134	115	516	203	342	139	127	129
10	118	413	194	101	133	115	542	203	312	160	127	129
11	127	403	193	101	134	115	490	202	362	140	110	129
12	127	193	193	102	134	115	434	201	340	108	101	114
13	128	175	193	105	134	118	412	201	208	106	101	107
14	129	229	181	114	134	120	401	176	120	106	96	158
15	271	249	181	135	134	120	396	142	122	106	92	407
16	213	247	161	249	134	116	393	131	215	138	95	268
17	131	247	163	358	134	115	337	131	212	153	95	365
18	126	247	163	209	134	114	340	131	188	153	95	352
19	155	224	125	167	117	114	340	131	185	153	95	208
20	143	209	108	169	111	113	395	72	142	153	87	119
21	157	209	127	148	123	113	543	93	122	153	77	285
22	206	213	134	113	117	114	611	120	122	154	77	569
23	669	327	134	107	106	115	663	103	108	182	77	506
24	749	415	134	96	106	115	690	79	89	178	78	512
25	737	362	134	95	107	116	672	80	89	153	97	485
26	707	144	148	96	110	129	622	80	89	153	106	455
27	680	136	170	98	108	141	563	80	89	154	106	446
28	653	201	157	126	108	141	504	80	90	154	108	425
29	590	271	134	155	110	142	461	80	89	153	108	380
30	539	249	134	153	---	145	419	80	89	131	108	320
31	509	---	127	152	---	192	---	80	---	97	106	---
TOTAL	8774	9994	5169	4241	3648	3769	13082	5128	4929	4056	3196	7842
MEAN	283	333	167	137	126	122	436	165	164	131	103	261
MAX	749	623	224	358	146	192	690	389	362	182	165	569
MIN	89	136	108	95	106	112	225	72	84	89	77	106

CAL YR 1979 TOTAL 113904 MEAN 312 MAX 2430 MIN 86 MEAN+ 329 CFSM+ 1.57 IN+ 21.27
WTR YR 1980 TOTAL 73828 MEAN 202 MAX 749 MIN 72 MEAN+ 221 CFSM+ 1.05 IN+ 14.33

+ Adjusted for diversion and change in contents in Greenwood Reservoir.

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1963, 1965, 1967 to November 1980 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	COLOR (PLATINUM COBALT UNITS)	TURBIDITY (NTU)	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT									
30...	1235	521	60	7.0	6.0	120	2.0	23	5.9
NOV									
29...	1345	255	70	7.1	1.5	80	2.0	30	7.8
DEC									
18...	1105	148	95	7.0	.5	70	2.0	37	9.7
JAN									
30...	1000	140	80	7.1	.5	65	1.8	38	9.6
FEB									
27...	1100	93	88	7.1	.0	50	.50	42	11
MAR									
26...	1030	101	88	7.5	.5	50	1.6	39	10
APR									
30...	1345	395	52	7.0	9.5	75	1.2	24	6.2
MAY									
27...	1230	85	85	7.4	20.0	40	1.8	38	9.9
JUN									
18...	1415	180	64	7.1	17.0	20	.70	29	7.3
AUG									
05...	1130	96	88	7.1	20.0	80	4.5	42	11
27...	1430	112	93	7.3	19.5	55	2.4	43	11
SEP									
25...	1135	450	46	6.9	9.5	100	1.0	23	5.7

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
OCT								
30...	2.1	.13	1300	--	910	50	20	30
NOV								
29...	2.6	.28	1200	--	690	50	0	50
DEC								
18...	3.1	.17	1100	190	910	70	0	70
JAN								
30...	3.4	.20	1100	--	800	50	10	40
FEB								
27...	3.5	.40	1100	350	750	50	10	40
MAR								
26...	3.4	.25	1200	330	870	50	10	40
APR								
30...	2.0	.29	1100	460	640	40	10	30
MAY								
27...	3.3	.03	860	460	400	130	80	50
JUN								
18...	2.5	.11	820	250	570	100	30	70
AUG								
05...	3.5	.08	2100	700	1400	260	20	240
27...	3.7	.09	1500	520	980	190	50	140
SEP								
25...	2.1	.08	1400	830	570	80	40	40

04058100 MIDDLE BRANCH ESCANABA RIVER NEAR PRINCETON, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	COLOR (PLATINUM COBALT UNITS)	TURBIDITY (NTU)	HARDNESS (MG/L AS CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
NOV									
05...	1315	120	71	7.2	2.5	55	1.0	32	8.0

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, SUSPENDED RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)
NOV								
05...	2.8	.13	1200	460	740	100	20	80

04058120 GREEN CREEK NEAR PALMER, MI

LOCATION.--Lat 46°22'22", long 87°36'21", in NW¼ sec.19, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at culvert on County Road 565, 4.5 mi (7.2 km) south of Palmer.

DRAINAGE AREA.--8.42 mi² (21.81 km²).

PERIOD OF RECORD.--Water years 1964-65, 1969 to November 1980 (discontinued).

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1964 to September 1965, March 1979 to September 1980.
SUSPENDED SEDIMENT DISCHARGE: October 1963 to September 1964 (fragmentary), October 1964 to September 1965.

INSTRUMENTATION.--Temperature recorder since Mar. 20, 1979.

REMARKS.--In addition to temperature recorder record, samples were collected approximately monthly. Since October 1964, flow affected by regulation from industrial tailings pond in headwaters and some diversion into basin from Schweitzer Reservoir (station 04058190).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 26.0°C June 25, 1980; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.0°C June 25; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT									
30...	1345	16	380	8.2	5.5	10	1.0	93	14
NOV									
29...	1100	36	400	8.0	3.0	10	1.0	99	15
DEC									
18...	1230	30	500	8.0	2.0	3	1.0	99	15
JAN									
30...	1130	41	400	8.1	.0	5	.50	97	14
FEB									
27...	1345	13	516	8.6	.0	5	1.5	100	14
MAR									
26...	0930	25	515	8.2	1.5	5	.75	98	13
APR									
30...	1005	27	424	8.2	9.5	5	.70	81	11
MAY									
27...	1600	4.2	504	8.6	19.5	6	1.5	93	14
JUN									
18...	0945	5.4	500	8.5	16.0	15	1.5	99	15
AUG									
05...	1415	5.5	446	8.1	21.5	25	2.8	110	18
27...	1020	7.0	440	8.2	18.5	5	2.0	120	20
SEP									
25...	1000	7.5	376	8.2	10.0	10	.50	110	18

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
OCT								
30...	14	.35	220	--	50	70	30	40
NOV								
29...	15	.71	340	--	40	130	20	110
DEC								
18...	15	.88	320	260	60	200	0	200
JAN								
30...	15	1.3	370	290	80	130	0	130
FEB								
27...	16	1.3	420	380	40	170	30	140
MAR								
26...	16	1.6	630	600	30	150	40	110
APR								
30...	13	1.1	330	300	30	110	50	60
MAY								
27...	14	.36	390	340	50	170	100	70
JUN								
18...	15	.23	600	580	20	270	240	30
AUG								
05...	16	.04	480	410	70	240	190	50
27...	17	.06	620	560	60	340	290	50
SEP								
25...	15	.03	480	430	50	190	140	50

04058120 GREEN CREEK NEAR PALMER, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV 05...	1030	6.2	388	4.3	1.5	0	.50	98	16

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV 05...	14	.55	330	270	60	80	40	40

04058120 GREEN CREEK NEAR PALMER, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.5	7.0	6.5	2.5	2.5	2.5	2.5	1.5	.5	3.0	.0
2	14.0	14.0	6.5	6.0	2.5	2.5	2.0	2.0	2.0	.0	3.0	.0
3	14.0	13.5	6.0	5.5	2.5	2.5	2.0	2.0	1.5	.0	.5	.0
4	13.5	12.5	5.5	5.0	2.5	2.5	2.5	2.0	.5	.0	.0	.0
5	12.5	12.0	5.0	5.0	2.5	2.5	2.0	2.0	1.5	.0	1.0	.0
6	12.5	11.0	5.0	4.5	2.5	2.5	2.0	1.5	2.0	.0	2.0	.0
7	11.0	10.0	4.5	4.0	2.5	2.5	2.0	1.5	.0	.0	2.0	.0
8	10.5	10.0	4.0	2.5	2.5	2.5	3.0	1.0	.5	.0	1.5	.0
9	9.5	9.0	2.5	2.5	2.5	2.5	3.0	.5	1.0	.5	1.0	.0
10	9.0	8.0	2.5	2.5	2.5	2.5	1.5	.5	1.5	1.0	.0	.0
11	8.5	8.0	3.0	2.5	2.5	2.5	1.5	.5	1.0	1.0	1.5	.0
12	8.5	6.0	2.5	2.5	2.5	2.5	1.5	.0	1.0	.5	2.5	.5
13	7.0	6.0	3.0	2.5	2.5	2.5	.0	.0	1.0	.5	.5	.5
14	6.5	6.0	2.5	2.5	2.5	2.0	.5	.0	2.0	.5	.5	.5
15	8.0	6.0	2.5	2.5	2.5	2.5	.5	.5	1.0	.5	2.0	.5
16	8.0	6.5	2.5	2.5	2.5	2.0	.5	.5	1.5	.5	1.0	.5
17	9.0	8.0	2.5	2.5	3.0	2.0	.5	.5	2.5	.0	1.0	.5
18	8.5	7.0	3.0	2.5	2.0	2.0	1.0	.5	1.0	.0	1.5	.5
19	9.5	8.5	3.5	3.0	2.0	2.0	1.0	1.0	.5	.5	1.5	1.0
20	10.5	9.5	3.5	3.5	2.0	2.0	1.0	1.0	.5	.5	1.5	1.0
21	11.5	10.5	3.5	3.5	2.0	2.0	1.5	1.0	.5	.5	2.0	1.5
22	11.0	9.5	3.0	3.0	2.5	2.0	1.0	.5	1.0	.5	2.5	1.5
23	9.0	7.0	3.0	3.0	2.5	2.5	2.0	.0	1.0	1.0	1.5	1.5
24	7.0	6.5	3.0	3.0	2.5	2.0	2.0	.0	1.0	.5	2.0	1.5
25	6.5	6.0	3.5	3.0	2.0	2.0	.5	.0	2.0	.5	2.5	1.5
26	6.0	5.5	3.5	3.0	2.0	2.0	.0	.0	3.0	.0	2.5	1.5
27	5.5	5.5	3.0	3.0	2.0	2.0	.0	.0	.5	.0	1.5	1.5
28	5.5	5.5	3.0	3.0	2.0	2.0	.0	.0	1.5	.0	2.5	1.5
29	5.5	5.5	3.0	3.0	2.0	2.0	2.0	.0	1.5	.0	3.0	2.0
30	5.5	5.0	3.0	2.5	2.0	2.0	2.0	.0	---	---	3.5	2.0
31	6.5	5.5	---	---	2.5	2.0	1.0	.0	---	---	3.5	2.0
MONTH	14.5	5.0	7.0	2.5	3.0	2.0	3.0	.0	3.0	.0	3.5	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	3.5	2.5	14.0	10.5	16.0	13.0	20.0	17.0	23.5	20.0	19.0	17.5
2	4.5	2.5	16.5	12.0	17.5	14.0	21.5	14.5	23.0	21.0	19.5	16.5
3	3.5	3.0	18.5	13.5	18.5	12.5	23.0	15.5	22.5	19.0	18.5	16.0
4	5.0	3.0	19.0	14.5	20.5	13.5	21.5	17.5	21.0	19.0	19.0	17.0
5	5.0	3.0	17.5	15.0	17.5	15.5	20.5	16.5	22.0	19.0	18.5	17.0
6	4.0	3.5	15.0	12.5	20.5	15.5	20.5	14.0	23.5	18.5	19.5	16.0
7	4.0	4.0	12.5	11.5	18.5	14.5	23.5	16.5	24.0	20.0	20.0	16.0
8	4.0	3.0	11.5	10.5	15.5	12.5	23.5	19.0	23.5	21.5	21.0	17.5
9	3.0	2.5	11.5	9.5	16.0	13.5	24.5	19.0	22.0	19.5	19.5	16.5
10	3.5	3.0	11.0	10.0	15.5	13.0	25.0	19.5	22.0	19.5	18.0	15.0
11	3.5	3.0	11.5	10.0	19.0	13.0	24.5	20.5	21.5	19.5	18.5	15.5
12	3.5	3.0	12.5	10.0	19.0	14.5	24.5	19.0	21.5	18.5	17.0	15.5
13	3.5	3.0	13.0	10.5	20.0	16.5	23.5	19.0	20.0	18.5	16.0	15.5
14	3.5	3.0	12.0	11.0	17.5	16.0	23.0	20.5	19.5	18.0	16.0	14.5
15	3.5	2.5	15.0	11.0	18.0	14.0	25.5	21.5	18.5	16.0	15.0	14.0
16	5.0	2.5	15.0	11.5	19.5	13.5	23.0	20.5	19.0	14.5	15.0	13.5
17	6.0	3.5	14.5	12.0	20.0	14.5	24.0	20.0	19.5	17.5	13.5	12.0
18	7.0	4.0	17.5	14.0	17.5	16.0	22.0	18.5	20.0	17.0	13.5	12.5
19	7.5	5.0	18.0	14.5	20.0	15.0	23.5	18.5	19.5	17.0	12.5	11.5
20	8.5	5.5	19.5	15.5	21.5	15.0	22.5	19.5	20.0	18.5	12.5	12.0
21	9.0	6.5	21.5	16.5	20.0	16.0	22.5	18.5	21.5	19.0	12.5	11.0
22	8.5	6.0	23.5	18.0	22.5	16.5	22.0	18.5	21.0	17.0	12.5	11.5
23	8.0	7.0	24.5	19.0	24.5	17.5	24.0	19.5	21.5	17.5	11.5	9.5
24	7.0	6.0	24.0	18.5	25.5	19.5	24.0	19.5	21.0	18.0	11.0	9.0
25	7.5	6.0	22.5	19.0	26.0	21.0	22.5	20.0	20.5	17.5	11.0	9.5
26	8.0	7.0	22.0	16.5	24.0	20.5	22.5	18.0	20.0	19.0	10.5	9.0
27	10.0	7.0	20.5	16.5	20.0	17.0	23.0	17.5	20.5	18.5	11.0	10.0
28	9.0	8.5	22.5	16.0	20.0	16.5	22.5	19.0	19.0	17.5	10.5	9.5
29	10.0	9.0	21.0	16.0	19.0	16.5	23.0	19.0	20.0	18.5	12.0	10.5
30	12.5	9.5	19.5	18.0	19.5	14.5	22.0	20.0	20.0	19.0	12.0	12.0
31	---	---	18.5	15.5	---	---	23.5	20.0	19.5	16.5	---	---
MONTH	12.5	2.5	24.5	9.5	26.0	12.5	25.5	14.0	24.0	14.5	21.0	9.0

04058130 GREEN CREEK NEAR PRINCETON, MI

LOCATION.--Lat 46°20'02", long 87°31'58", in SW¼ SW¼ sec.35, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on right bank 100 ft (30 m) downstream from bridge on State Highway 35, 3.0 mi (4.8 km) upstream from mouth, 4.0 mi (6.4 km) northwest of Princeton.

DRAINAGE AREA.--13.8 mi^2 (35.7 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1961-65. October 1976 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,165.74 ft (355.318 m) National Geodetic Vertical Datum of 1929. Oct. 3, 1960 to July 21, 1965, Oct. 1, 1976 to Oct. 14, 1977, nonrecording gage at bridge 100 ft (30 m) upstream at datum 0.97 ft (0.296 m) higher.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Apr. 15 to May 6, which are fair. Since October 1964, flow affected by regulation from industrial tailings pond in headwaters and some diversion into basin from Schweitzer Reservoir (station 04058190).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 166 ft^3/s (4.70 m^3/s) Sept. 12, 1978, gage height, 5.75 ft (1.753 m); maximum gage height, 7.23 ft (2.204 m) Mar. 27, 1979, backwater from ice; minimum discharge observed, 2.84 ft^3/s (0.080 m^3/s) Oct. 1, 1963, discharge measurement.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 100 ft^3/s (2.83 m^3/s) Apr. 22; maximum gage height, 5.71 ft (1.740 m) Mar. 24, backwater from ice; minimum discharge, 3.9 ft^3/s (0.11 m^3/s) July 4, Aug. 17; minimum gage height, 1.94 ft (0.591 m) July 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	12	43	44	24	19	15	48	45	8.8	6.3	14	9.6
2	16	39	41	23	19	14	50	41	10	6.3	11	11
3	19	35	39	23	19	14	51	38	8.8	5.5	10	10
4	32	34	40	23	19	14	49	35	8.5	4.3	10	12
5	31	34	40	23	19	14	51	33	9.1	4.9	12	13
6	25	36	39	24	19	14	52	32	14	4.5	8.2	12
7	25	35	39	24	19	14	60	31	14	7.1	7.7	12
8	26	35	38	23	18	15	66	29	13	6.7	7.6	11
9	27	34	37	23	18	15	79	24	15	6.0	7.3	12
10	23	35	37	23	18	15	73	23	20	6.1	7.4	9.4
11	21	32	39	23	18	17	57	24	17	6.0	7.9	8.7
12	20	32	38	23	18	17	44	24	15	5.7	7.5	8.3
13	20	33	38	23	17	17	37	24	13	5.6	5.5	11
14	20	33	37	23	17	17	33	24	15	6.4	5.6	20
15	20	33	37	24	17	17	31	24	13	6.7	5.1	38
16	20	32	36	28	17	19	31	24	11	5.4	4.9	26
17	20	33	35	30	17	20	35	23	10	5.1	4.8	35
18	19	32	35	27	17	20	45	23	9.6	4.9	5.2	26
19	20	33	34	25	17	21	60	22	9.4	5.5	5.0	17
20	21	34	32	23	17	22	80	21	8.6	6.9	5.7	12
21	25	35	30	22	17	23	96	21	7.9	6.9	5.7	35
22	44	38	29	21	17	24	100	19	8.1	8.6	5.4	54
23	76	40	29	20	17	25	96	17	7.8	11	5.4	50
24	72	40	29	20	17	26	90	15	7.4	10	7.8	48
25	64	39	29	19	17	27	80	14	7.4	14	12	46
26	66	43	30	19	16	28	74	12	6.8	11	9.2	44
27	57	48	30	19	16	30	68	11	6.3	10	9.4	42
28	53	45	29	19	15	32	62	8.5	6.6	9.8	8.4	39
29	40	44	28	19	15	34	56	7.2	6.9	9.4	8.1	34
30	33	45	26	19	---	36	50	8.2	6.4	18	7.8	30
31	31	---	25	19	---	45	---	12	---	17	7.4	---
TOTAL	998	1104	1069	698	506	661	1804	708.9	314.4	241.6	239.0	736.0
MEAN	32.2	36.8	34.5	22.5	17.4	21.3	60.1	22.9	10.5	7.79	7.71	24.5
MAX	76	48	44	30	19	45	100	45	20	18	14	54
MIN	12	32	25	19	15	14	31	7.2	6.3	4.3	4.8	8.3

CAL YR 1979 TOTAL 14299.0 MEAN 39.2 MAX 108 MIN 12
WTR YR 1980 TOTAL 9079.9 MEAN 24.8 MAX 100 MIN 4.3

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1961-64, 1971, 1977 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: January 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum (1977, 1980), 24.5°C July 15, 1980; minimum, 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.5°C July 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	13.0	11.0	11.5	8.5	6.0	7.5	.5	.5	.5	---	---	---
2	12.5	11.0	11.5	6.0	4.5	5.5	.5	.5	.5	---	---	---
3	12.0	11.5	11.5	4.5	3.5	4.0	.5	.5	.5	---	---	---
4	11.5	10.0	10.5	4.5	3.5	4.0	.5	.5	.5	---	---	---
5	10.5	9.0	9.5	4.5	4.5	4.5	1.0	.5	.5	---	---	---
6	10.0	9.5	9.5	4.5	3.0	3.5	1.5	1.0	1.5	---	---	---
7	9.5	8.0	9.0	3.0	2.0	2.5	1.0	.5	.5	---	---	---
8	8.5	7.5	8.0	2.5	1.0	1.5	.5	.5	.5	---	---	---
9	8.0	7.0	7.5	1.0	.5	1.0	.5	.5	.5	---	---	---
10	7.5	6.0	7.0	1.0	.5	.5	.5	.5	.5	---	---	---
11	7.5	6.0	6.5	1.0	.5	1.0	1.0	.5	1.0	---	---	---
12	7.0	5.0	6.0	1.0	.5	1.0	1.0	.5	.5	---	---	---
13	5.0	4.0	4.5	1.0	.5	.5	.5	.5	.5	---	---	---
14	5.5	4.0	4.5	1.0	.5	1.0	.5	.5	.5	---	---	---
15	7.0	4.5	5.5	1.5	.5	1.0	.5	.5	.5	---	---	---
16	8.0	5.0	6.5	1.5	.5	1.0	.5	.5	.5	---	---	---
17	9.0	7.5	8.0	2.5	1.5	2.0	.5	.5	.5	---	---	---
18	7.5	5.0	6.5	2.0	1.0	1.5	.5	.5	.5	---	---	---
19	10.0	7.5	9.0	3.0	2.0	2.5	.5	.5	.5	---	---	---
20	11.5	10.0	10.5	3.0	2.5	3.0	.5	.5	.5	---	---	---
21	12.0	11.0	11.5	2.5	2.0	2.5	.5	.5	.5	---	---	---
22	11.0	8.0	9.5	2.5	1.5	2.0	.5	.5	.5	.0	.0	.0
23	8.0	4.5	6.0	2.5	2.5	2.5	1.0	.0	.5	.0	.0	.0
24	4.5	3.0	4.5	2.5	2.0	2.5	1.5	1.0	1.0	.0	.0	.0
25	4.5	3.5	4.0	2.0	1.0	1.5	1.0	.5	1.0	.0	.0	.0
26	4.5	3.0	3.5	2.5	1.0	1.5	---	---	---	.0	.0	.0
27	4.5	4.0	4.0	2.5	1.5	2.0	---	---	---	.0	.0	.0
28	5.5	4.5	5.0	1.5	1.0	1.0	---	---	---	.0	.0	.0
29	5.0	4.5	5.0	1.0	.5	.5	---	---	---	.0	.0	.0
30	6.0	4.5	5.5	.5	.5	.5	---	---	---	.0	.0	.0
31	8.0	6.0	6.5	---	---	---	---	---	---	.0	.0	.0
MONTH	13.0	3.0	7.5	8.5	.5	2.0						

04058130 GREEN CREEK NEAR PRINCETON, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	4.0	1.0	2.5	15.0	9.0	12.0
2	.0	.0	.0	.0	.0	.0	4.5	1.0	2.5	16.0	10.5	13.0
3	.0	.0	.0	.0	.0	.0	3.0	1.0	1.5	17.0	11.0	14.0
4	.0	.0	.0	.0	.0	.0	5.5	1.5	3.5	17.5	12.5	15.0
5	.0	.0	.0	.0	.0	.0	6.5	2.0	4.0	16.5	14.0	15.5
6	.0	.0	.0	.5	.0	.0	4.5	2.0	3.0	14.0	10.0	11.5
7	.0	.0	.0	.5	.0	.0	3.5	2.5	3.0	10.0	8.5	9.0
8	.0	.0	.0	.0	.0	.0	3.5	1.5	2.5	9.0	8.0	8.5
9	.0	.0	.0	.0	.0	.0	1.5	.5	1.0	10.0	7.5	8.5
10	.0	.0	.0	.0	.0	.0	2.5	1.0	1.5	10.5	8.5	9.5
11	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	11.5	9.0	10.0
12	.0	.0	.0	.0	.0	.0	3.0	1.5	2.0	12.0	8.0	10.0
13	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	12.0	9.0	10.0
14	.0	.0	.0	.0	.0	.0	2.0	1.5	1.5	10.5	9.5	10.0
15	.0	.0	.0	.0	.0	.0	3.5	1.5	2.0	13.5	8.0	10.5
16	.0	.0	.0	.0	.0	.0	5.0	.5	2.5	15.5	9.5	12.0
17	.0	.0	.0	.0	.0	.0	8.5	3.5	5.5	15.0	12.0	13.0
18	.0	.0	.0	.0	.0	.0	9.0	4.5	7.0	17.0	12.5	14.5
19	.0	.0	.0	.0	.0	.0	9.0	5.5	7.5	17.5	12.5	15.0
20	.0	.0	.0	.0	.0	.0	10.5	5.5	8.0	18.5	13.0	15.5
21	.0	.0	.0	.0	.0	.0	12.0	7.0	9.0	20.5	14.0	17.0
22	.0	.0	.0	.0	.0	.0	12.5	7.5	10.0	22.0	16.0	19.0
23	.0	.0	.0	.0	.0	.0	10.5	5.5	7.5	22.0	17.0	19.5
24	.0	.0	.0	.0	.0	.0	5.0	3.5	4.5	22.0	16.5	19.5
25	.0	.0	.0	.0	.0	.0	7.5	4.5	6.0	20.0	16.5	18.5
26	.0	.0	.0	.0	.0	.0	7.5	6.5	7.0	18.5	13.0	16.0
27	.0	.0	.0	.0	.0	.0	11.0	6.5	8.5	18.0	13.5	16.0
28	.0	.0	.0	.0	.0	.0	9.0	7.0	8.5	20.0	14.5	17.0
29	.0	.0	.0	2.0	.0	.5	10.5	8.5	9.0	18.0	15.5	17.0
30	---	---	---	3.5	.0	1.5	14.0	9.0	11.0	17.5	16.0	16.5
31	---	---	---	3.5	.5	2.0	---	---	---	17.0	14.0	15.5
MONTH	.0	.0	.0	3.5	.0	.0	14.0	.5	5.0	22.0	7.5	14.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	14.5	12.0	12.5	18.5	15.5	16.5	22.5	17.5	20.0	17.0	16.0	16.5
2	15.0	11.5	13.0	19.5	13.5	16.5	21.5	18.5	20.5	17.5	14.5	16.0
3	16.0	11.0	13.5	21.0	14.5	18.0	20.5	16.5	19.0	16.0	13.5	14.5
4	17.0	11.5	14.5	20.5	16.5	18.5	19.5	16.5	17.5	17.5	14.5	16.0
5	16.0	13.0	13.5	18.0	15.5	17.0	21.5	17.0	19.0	17.0	14.5	16.0
6	19.0	12.5	15.5	19.0	12.5	15.5	22.5	17.0	20.0	17.0	13.0	15.0
7	17.5	13.5	15.5	21.5	15.5	18.5	23.0	19.0	21.0	17.5	13.5	15.5
8	13.0	10.5	12.0	22.0	18.0	20.0	22.5	21.0	21.5	19.0	15.0	17.0
9	14.5	11.0	12.5	23.0	18.0	20.0	21.0	18.0	19.5	19.0	16.0	18.0
10	14.5	10.5	12.5	23.0	18.0	20.5	20.5	17.5	19.0	16.0	12.5	14.5
11	16.5	10.5	13.5	23.5	19.5	21.0	19.5	18.0	18.5	16.0	13.0	14.5
12	18.0	13.0	15.5	22.0	17.5	19.5	20.5	16.5	18.5	14.5	14.0	14.0
13	19.5	15.5	17.5	21.0	17.5	19.5	18.5	17.5	18.0	14.5	13.5	14.0
14	17.5	14.5	16.0	21.0	19.0	20.0	19.0	16.5	17.5	14.5	13.0	13.5
15	16.0	12.0	14.0	24.5	19.5	21.5	17.5	14.5	16.0	13.0	12.0	12.5
16	16.5	11.0	14.0	22.0	20.0	21.0	17.5	13.0	15.0	13.5	12.5	13.0
17	17.5	12.5	15.0	23.5	19.0	21.0	16.5	15.5	16.0	12.0	9.5	10.5
18	16.5	14.0	15.0	20.5	17.5	18.0	20.0	15.5	17.5	11.0	10.0	10.5
19	17.5	12.5	15.0	22.0	16.0	19.0	18.0	16.5	17.5	11.0	9.5	10.0
20	17.5	13.0	15.5	20.0	17.5	18.5	19.5	17.5	18.0	12.0	11.0	11.5
21	17.0	14.5	16.0	20.5	16.5	18.0	22.0	18.5	20.0	11.5	10.0	10.5
22	20.0	14.5	17.0	20.0	16.5	18.0	21.0	16.5	18.5	12.0	10.0	11.0
23	21.5	16.0	19.0	20.5	15.5	18.0	20.5	16.0	18.5	11.0	9.0	9.5
24	22.5	18.0	20.5	22.0	16.5	19.5	18.5	16.5	17.5	9.5	7.5	8.5
25	24.0	20.0	22.0	21.5	19.0	20.5	20.0	16.0	17.5	9.0	8.5	9.0
26	22.5	19.5	21.0	19.5	15.5	17.5	19.5	18.0	18.5	9.0	7.0	8.0
27	19.0	14.5	16.5	19.5	14.0	17.0	19.5	16.5	17.5	9.0	7.0	8.0
28	17.0	14.0	15.0	19.5	16.0	18.0	17.0	15.5	16.0	9.0	6.5	8.0
29	16.5	15.0	15.5	21.5	16.5	19.0	18.0	16.0	17.0	12.0	9.0	10.5
30	17.5	13.5	15.0	20.0	17.0	18.5	19.0	17.5	18.5	12.0	11.5	11.5
31	---	---	---	21.5	17.5	19.5	17.5	15.0	16.5	---	---	---
MONTH	24.0	10.5	15.5	24.5	12.5	19.0	23.0	13.0	18.0	19.0	6.5	12.5

04058190 SCHWEITZER RESERVOIR NEAR PALMER, MI

LOCATION.--Lat 46°25'00", long 87°38'48", in SE¼ NW¼ sec.2, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on left bank 120 ft (36 m) upstream from dam on Schweitzer Creek, and 3.0 mi (4.8 km) southwest of Palmer.

DRAINAGE AREA.--23.1 mi² (59.8 km²).

PERIOD OF RECORD.--January 1963 to current year (monthend contents only).

GAGE.--Water-stage recorder. Datum of gage is 1,300.00 ft (396.240 m) Cleveland-Cliffs Iron Co. datum; gage readings have been reduced to elevations NGVD. Prior to Oct. 25, 1967, nonrecording gage at same site and datum.

REMARKS.--Reservoir is formed by an earthfill dam with fixed crest concrete spillway completed in 1963. Usable capacity of reservoir is 5,300 acre-ft (6.53 hm³) at spillway elevation 1,338.00 ft (407.822 m). The dam includes a discharge pipe equipped with valve to control release flow to Schweitzer Creek (station 04058200). An average of 2.2 ft³/s (0.062 m³/s) was diverted from the headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 34 ft³/s (0.96 m³/s) was diverted from reservoir for iron ore processing, some returned to Middle Branch Escanaba River basin via Green Creek and some returned to the East Branch Escanaba River basin via Goose Lake Outlet. Since January 1973, controlled diversion from Greenwood Reservoir (station 04057811) via Greenwood Diversion (station 04057813) into Schweitzer Reservoir. Controlled inflow averaged 24.2 ft³/s (0.69 m³/s) for the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents recorded, 5,900 acre-ft (7.27 hm³) May 31, 1970, elevation, 1,339.5 ft (408.28 m); minimum recorded since first filling, 2,920 acre-ft (3.60 hm³) Apr. 10, 1974, elevation, 1,329.7 ft (405.29 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents recorded, 5,420 acre-ft (6.68 hm³) Apr. 9-11, 22, elevation, 1,338.3 ft (407.91 m), but may have been more during period of no gage-height record, Oct. 23-25; minimum, 4,320 acre-ft (5.33 hm³) Oct. 8, 9, elevation, 1,334.9 ft (406.88 m).

MONTHEND ELEVATION, IN FEET NGVD, AND CONTENTS AT 2400, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	Elevation (feet)	Contents (acre-feet)	Change in contents (acre-feet)	Change in contents (equivalent in ft³/s)
Sept. 30	1335.4	4470	--	--
Oct. 31	1338.1	5340	+870	+14.1
Nov. 30	1338.0	5300	-40	-0.7
Dec. 31	1336.0	4650	-650	-10.6
CAL YR 1979	--	--	-650	-0.9
Jan. 31	1337.9	5260	+610	+9.9
Feb. 29	1337.8	5230	-30	-0.5
Mar. 31	1336.2	4710	-520	-8.5
Apr. 30	1338.0	5300	+590	+9.9
May 31	1335.4	4470	-830	-13.5
June 30	1337.1	4980	+510	+8.6
July 31	1337.2	5020	+40	+0.7
Aug. 31	1336.9	4920	-100	-1.6
Sept. 30	1337.6	5160	+240	+4.0
WTR YR 1980	--	--	+690	+1.0

04058200 SCHWEITZER CREEK NEAR PALMER, MI

LOCATION.--Lat 46°24'40", long 87°37'27", in SW¼ sec.1, T.46 N., R.27 W., Marquette County, Hydrologic Unit 04030110, on right bank 10 ft (3 m) upstream from highway bridge, and 2.5 mi (4.0 km) southwest of Palmer.

DRAINAGE AREA.--23.6 mi² (61.1 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Concrete control since Oct. 1, 1963. Altitude of gage is 1,270 ft (387 m) from topographic map (nearest 10 ft). Prior to Aug. 21, 1961, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter period, which are fair. Since August 1962, flow completely regulated by Schweitzer Reservoir (station 04058190) 1.0 mi (1.6 km) upstream. An average of 2.2 ft³/s (0.062 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 34 ft³/s (0.96 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek and some returned to East Branch Escanaba River via Goose Lake Outlet. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) May 31, 1970, gage height, 6.50 ft (1.981 m); minimum, 0.4 ft³/s (0.011 m³/s) Sept. 6, 1962, gage height, 1.22 ft (0.372 m); minimum daily, 1.0 ft ³/s (0.028 m³/s) Apr. 9-18, May 5, 6, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 127 ft³/s (3.60 m³/s) Oct. 24, gage height, 4.12 ft (1.256 m); minimum, 4.9 ft³/s (0.14 m³/s) Mar. 6; minimum daily, 5.5 ft³/s (0.16 m³/s) Mar. 8, 9, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.7	43	7.9	5.9	5.7	5.6	6.4	7.2	5.9	6.0	5.6	6.4
2	5.7	47	6.7	5.8	5.7	5.6	6.5	6.4	6.0	5.9	5.7	6.0
3	5.8	34	6.1	5.7	5.7	5.6	6.3	6.2	5.8	5.9	5.6	6.1
4	5.7	23	6.1	5.7	5.7	5.6	6.3	6.2	5.8	5.9	5.8	5.9
5	5.6	18	6.1	5.7	5.7	5.6	6.4	6.2	5.9	6.1	12	5.7
6	5.7	19	6.1	5.7	5.7	5.6	6.7	6.1	5.9	5.9	52	5.7
7	5.7	14	6.1	5.8	5.6	5.6	7.1	6.1	6.2	6.4	36	5.8
8	5.7	14	6.1	5.8	5.6	5.5	7.6	6.2	5.9	5.9	22	5.7
9	5.8	11	6.1	5.8	5.6	5.5	48	6.1	5.9	5.8	9.6	6.1
10	5.7	9.4	6.1	5.8	5.6	5.6	78	6.2	5.8	5.8	6.3	5.7
11	5.8	7.0	6.1	5.8	5.7	5.6	61	6.1	5.8	5.8	6.1	5.7
12	6.0	6.4	5.9	5.8	5.6	5.6	44	6.1	5.8	5.9	5.9	6.1
13	6.1	6.1	5.9	5.8	5.6	5.6	32	6.0	6.1	5.8	5.9	6.7
14	5.8	6.1	5.9	5.8	5.6	5.6	23	6.1	6.2	6.3	5.9	6.4
15	5.8	6.1	5.9	5.8	5.6	5.5	15	5.9	5.9	5.8	5.9	6.1
16	5.8	6.1	5.9	5.8	5.6	5.6	8.0	5.9	5.9	5.9	5.9	6.1
17	5.7	6.1	5.9	5.9	5.6	5.6	6.6	5.9	5.9	5.8	5.9	6.0
18	5.7	6.1	5.9	5.9	5.6	5.7	9.0	5.9	5.8	5.9	5.9	6.2
19	5.8	6.2	5.9	5.9	5.6	5.9	27	5.8	5.9	5.8	5.9	6.0
20	5.8	6.3	5.9	5.9	5.7	5.9	45	5.8	5.8	6.3	5.9	6.1
21	6.1	8.7	5.9	5.8	5.6	5.8	47	5.8	5.8	6.2	5.8	19
22	9.2	12	5.9	5.8	5.6	5.8	42	5.7	5.8	5.9	5.8	68
23	42	13	5.9	5.8	5.6	5.8	35	5.8	5.8	5.8	5.7	33
24	114	13	5.9	5.8	5.6	5.7	26	5.7	5.8	5.7	6.2	15
25	75	11	5.9	5.8	5.6	5.7	19	5.7	5.7	6.1	6.0	11
26	55	15	5.9	5.7	5.6	5.9	16	5.7	5.8	5.8	5.8	12
27	50	15	5.9	5.7	5.6	5.9	15	5.6	5.8	5.7	5.9	9.8
28	60	13	5.9	5.7	5.6	6.0	13	5.7	5.9	5.7	5.9	6.8
29	59	12	5.9	5.7	5.6	6.2	10	5.7	6.2	5.7	5.9	6.2
30	40	9.6	5.9	5.7	---	6.5	8.4	5.9	6.0	5.7	5.9	6.1
31	30	---	5.8	5.7	---	6.5	---	6.3	---	5.7	5.8	---
TOTAL	655.7	417.2	187.4	179.3	163.2	178.2	681.3	186.0	176.8	182.9	284.5	307.4
MEAN	21.2	13.9	6.05	5.78	5.63	5.75	22.7	6.00	5.89	5.90	9.18	10.2
MAX	114	47	7.9	5.9	5.7	6.5	78	7.2	6.2	6.4	52	68
MIN	5.6	6.1	5.8	5.7	5.6	5.5	6.3	5.6	5.7	5.7	5.6	5.7

CAL YR 1979 TOTAL 8800.5 MEAN 24.1 MAX 280 MIN 5.6
WTR YR 1980 TOTAL 3599.9 MEAN 9.84 MAX 114 MIN 5.5

04058250 WARNER CREEK TRIBUTARY NEAR PALMER, MI

LOCATION.--Lat 46°25'20", long 87°36'09", in NW¼ SE¼ sec.31, T.47 N., R.26 W., Marquette County, Hydrologic Unit 04030110, at double culvert on County Road 565, 0.3 mi (0.5 km) upstream from mouth, and 0.8 mi (1.3 km) south of Palmer.

DRAINAGE AREA.--4.05 mi² (10.49 km²).

PERIOD OF RECORD.--Water years 1972 to November 1980 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT									
30...	1500	9.3	320	7.3	6.0	30	2.0	110	26
NOV									
29...	1000	3.2	350	7.2	1.5	30	2.0	120	30
DEC									
18...	1330	2.0	500	7.3	.5	25	1.0	150	37
JAN									
30...	1345	1.4	365	7.3	.0	10	1.6	160	38
FEB									
27...	1500	1.6	464	7.5	.0	10	1.5	170	41
MAR									
26...	0845	3.0	360	7.7	1.0	10	1.6	130	32
APR									
30...	0845	2.6	349	7.4	9.5	15	1.5	92	22
MAY									
27...	1645	.59	444	7.6	18.0	12	1.8	140	34
JUN									
18...	0840	.76	406	7.6	15.0	20	1.0	120	29
AUG									
05...	1500	8.0	438	7.2	19.5	22	3.3	140	33
27...	0900	1.2	486	7.5	18.0	10	1.0	160	37
SEP									
25...	0850	2.4	264	7.3	8.5	60	.60	93	21

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
OCT								
30...	11	1.1	440	--	190	40	10	30
NOV								
29...	12	.84	870	--	190	50	10	40
DEC								
18...	15	.70	420	240	180	90	0	90
JAN								
30...	16	.24	470	320	150	110	0	110
FEB								
27...	17	1.2	580	400	180	170	0	170
MAR								
26...	13	.45	610	430	180	140	20	120
APR								
30...	9.0	.36	460	320	140	40	10	30
MAY								
27...	14	.03	610	440	170	140	0	140
JUN								
18...	12	.01	430	300	130	80	10	70
AUG								
05...	15	.02	970	710	260	270	40	230
27...	17	.01	470	320	150	140	20	120
SEP								
25...	9.8	.04	660	330	330	60	0	60

04058250 WARNER CREEK TRIBUTARY NEAR PALMER, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV 05...	0900	2.5	403	7.4	2.5	10	.80	140	32

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV 05...	14	.17	390	270	120	80	20	60

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI

LOCATION.--Lat 46°23'36", long 87°29'40", in SE¼ SE¼ sec.12, T.46 N., R.26 W., Marquette County, Hydrologic Unit 04030110, on left bank 0.8 mi (1.3 km) upstream from mouth, and 3 mi (5 km) west of Sands Station.

DRAINAGE AREA.--37.5 mi² (97.1 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,160 ft (354 m) from topographic map (nearest 10 ft).

REMARKS.--Water-discharge records good. Flow includes an average of 9.6 ft³/s (0.27 m³/s) discharged into basin from mine tailings pond 3 mi (5 km) upstream, the greater part diverted from Schweitzer Reservoir (station 04058190). Diversion began October 1979.

AVERAGE DISCHARGE.--10 years (water years 1966-75), 32.8 ft³/s (0.929 m³/s), 11.88 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 458 ft³/s (13.0 m³/s) May 31, 1970, gage height, 5.89 ft (1.795 m); minimum, 3.7 ft³/s (0.10 m³/s) Oct. 10, 1976, Jan. 22, Feb. 14 and part or all of each day Feb. 16-23, Feb. 26 to Mar. 8, 1977, gage height, 1.35 ft (0.411 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 178 ft³/s (5.04 m³/s) Apr. 10, gage height, 3.97 ft (1.210 m); minimum, 6.2 ft³/s (0.18 m³/s) Aug. 19, 20, gage height, 1.45 ft (0.442 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	119	60	34	40	29	43	55	19	22	18	18
2	15	105	55	34	40	29	43	50	20	21	17	19
3	18	99	53	34	39	29	46	47	20	20	17	19
4	18	89	52	37	39	29	50	44	18	20	18	19
5	17	84	53	33	39	30	58	41	17	20	19	18
6	17	82	50	33	40	30	67	39	17	19	19	17
7	15	71	49	35	37	28	78	37	18	20	20	17
8	18	51	48	35	37	21	97	36	19	19	20	17
9	20	45	47	35	37	22	146	34	20	19	20	16
10	22	42	46	35	36	22	172	33	25	18	20	17
11	23	36	46	37	36	22	157	33	27	18	20	17
12	23	37	46	37	36	23	132	30	25	18	19	17
13	31	62	46	36	35	23	111	29	25	18	19	24
14	31	59	45	36	34	23	96	28	31	19	19	28
15	29	58	43	37	32	23	87	27	31	19	19	25
16	29	54	42	44	32	24	76	25	30	19	18	27
17	15	55	41	45	31	24	71	25	28	12	18	26
18	13	54	40	46	30	19	72	24	26	18	17	26
19	14	54	39	47	29	20	79	23	25	18	8.8	25
20	14	55	39	47	29	23	87	22	24	23	7.5	28
21	17	55	38	48	29	23	87	21	22	24	7.5	56
22	38	61	38	46	29	24	83	20	22	22	7.1	65
23	65	61	39	47	29	26	78	20	22	21	7.1	55
24	76	60	40	45	28	26	74	19	23	20	8.5	52
25	67	58	40	44	29	27	72	18	23	23	9.6	49
26	61	64	40	43	31	29	70	17	23	21	8.6	52
27	61	68	40	42	29	31	69	17	22	20	15	49
28	65	66	39	42	28	31	66	16	21	20	16	47
29	68	64	38	41	30	31	63	15	22	19	16	45
30	95	60	36	41	---	35	60	15	22	19	16	42
31	93	---	35	39	---	39	---	19	---	18	16	---
TOTAL	1105	1928	1363	1235	970	815	2490	879	687	607	480.7	932
MEAN	35.6	64.3	44.0	39.8	33.4	26.3	83.0	28.4	22.9	19.6	15.5	31.1
MAX	95	119	60	48	40	39	172	55	31	24	20	65
MIN	13	36	35	33	28	19	43	15	17	12	7.1	16

CAL YR 1979 TOTAL 16319.0 MEAN 44.7 MAX 380 MIN 11
WTR YR 1980 TOTAL 13491.7 MEAN 36.9 MAX 172 MIN 7.1

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1972 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATUES: November 1976 to current year.

INSTRUMENTATION.--Water-quality monitor since November 1976.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument. Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 21.0°C June 25, July 10, 11, 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	OCTOBER			NOVEMBER			DECEMBER			JANUARY		
1	12.0	10.0	11.0	9.0	6.5	8.0	1.0	.5	.5	1.5	1.0	1.0
2	11.0	10.5	11.0	6.5	4.5	5.5	1.0	.5	1.0	1.0	.0	.5
3	11.0	10.5	10.5	5.0	4.0	4.5	1.0	.5	1.0	.0	.0	.0
4	10.5	9.0	10.0	4.5	4.0	4.5	1.5	1.0	1.0	.0	.0	.0
5	10.0	8.0	9.0	5.0	4.5	5.0	2.0	1.0	1.5	.0	.0	.0
6	9.5	8.5	9.0	5.0	4.0	4.5	2.0	1.0	1.5	.0	.0	.0
7	9.0	8.0	8.5	4.0	2.5	3.0	1.0	1.0	1.0	.0	.0	.0
8	8.5	8.0	8.0	2.5	1.0	2.0	1.0	.5	.5	.0	.0	.0
9	8.5	7.0	8.0	1.5	.5	1.0	1.0	.0	.5	.0	.0	.0
10	8.5	6.5	7.5	1.5	.5	1.0	1.5	1.0	1.0	.0	.0	.0
11	8.5	7.0	8.0	1.0	.5	1.0	1.5	.5	1.0	.0	.0	.0
12	8.0	5.0	7.0	2.0	1.0	1.0	.5	.0	.0	.0	.0	.0
13	6.5	4.0	5.5	2.5	1.0	1.5	1.0	.0	.5	.0	.0	.0
14	7.0	5.5	6.5	2.5	1.0	2.0	1.0	.5	.5	.5	.0	.0
15	8.0	6.0	7.0	2.5	1.5	2.0	1.0	.5	1.0	1.0	.5	.5
16	9.0	6.0	7.5	3.0	1.0	2.0	.5	.0	.0	1.0	.5	.5
17	9.0	7.0	8.0	3.5	2.0	2.5	.5	.0	.0	1.0	.5	1.0
18	7.5	5.0	6.0	3.5	1.5	2.5	.5	.0	.0	1.0	.5	.5
19	9.5	7.5	8.5	4.5	3.0	3.5	.5	.5	.5	1.0	.0	.5
20	10.5	9.5	10.0	4.0	3.5	3.5	1.0	.5	1.0	.5	.0	.0
21	11.5	10.5	11.0	3.5	3.0	3.0	1.5	1.0	1.0	.0	.0	.0
22	10.0	7.5	9.0	3.0	2.5	3.0	2.0	1.5	1.5	.5	.0	.0
23	7.5	2.5	5.0	3.0	3.0	3.0	1.5	1.5	1.5	.0	.0	.0
24	3.0	2.0	2.5	3.0	3.0	3.0	1.5	1.0	1.5	.0	.0	.0
25	3.0	2.5	2.5	3.0	1.5	2.5	1.0	.5	.5	.0	.0	.0
26	3.5	2.5	3.0	3.0	1.5	2.0	1.5	.5	1.0	1.0	.0	.0
27	4.0	3.5	3.5	3.0	2.0	2.5	1.0	.0	.5	.5	.0	.0
28	4.5	4.0	4.0	2.0	1.0	1.5	1.5	.0	.5	1.0	.0	.5
29	5.0	4.5	4.5	1.5	1.0	1.0	1.5	.0	.5	.5	.0	.0
30	6.5	4.5	5.5	1.0	.5	.5	1.5	.0	.5	.0	.0	.0
31	8.5	6.0	7.0	---	---	---	1.5	.5	1.0	.5	.0	.0
MONTH	12.0	2.0	7.0	9.0	.5	3.0	2.0	.0	1.0	1.5	.0	.0

04058400 GOOSE LAKE OUTLET NEAR SANDS STATION, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.0	.0	.5	.0	.0	5.0	.5	2.5	13.5	9.0	11.0
2	.5	.0	.0	1.0	.0	.0	5.0	.5	2.5	14.5	10.5	12.5
3	.5	.0	.0	2.0	.0	1.0	2.5	.0	1.0	15.0	11.0	13.0
4	1.5	.0	.5	2.0	.5	1.0	5.0	.5	2.5	15.5	12.0	14.0
5	1.0	.0	.0	2.0	.0	1.0	5.5	1.0	3.0	15.0	13.0	14.0
6	.5	.0	.0	1.0	.0	.0	3.5	1.0	2.0	13.0	9.0	10.5
7	1.5	.0	.5	2.5	.0	1.0	3.0	2.0	2.5	8.5	7.0	7.5
8	2.0	.0	1.0	2.0	.0	.5	2.0	.5	1.5	8.5	7.0	7.5
9	2.0	.0	.5	2.5	.0	1.0	.5	.0	.5	9.0	7.0	8.0
10	1.0	.0	.5	2.0	.0	1.0	1.5	.0	1.0	9.5	7.5	8.5
11	2.0	.0	.5	.5	.0	.0	2.0	.0	1.0	11.0	8.5	9.5
12	2.0	.0	1.0	1.0	.0	.0	2.0	.5	1.5	11.0	7.5	9.5
13	2.0	.5	1.0	2.0	.0	1.0	1.5	.0	.5	11.5	8.5	9.5
14	1.5	.0	.5	3.0	.5	1.5	1.5	.0	.5	10.0	8.5	9.5
15	1.5	.0	.5	2.5	.0	1.0	2.5	.5	1.0	13.0	7.5	10.0
16	.5	.0	.0	3.5	1.0	2.0	4.0	.0	2.0	14.0	8.5	11.5
17	1.0	.0	.0	3.5	2.0	2.5	7.5	2.0	5.0	14.5	10.5	12.5
18	2.0	.0	.5	4.0	.0	2.0	8.5	4.0	6.5	15.5	12.0	13.5
19	2.0	1.0	1.5	5.0	1.0	3.0	8.5	5.5	7.0	15.5	10.5	13.5
20	2.5	1.5	2.0	3.5	2.0	2.5	9.0	5.0	7.5	17.0	12.0	14.5
21	2.0	1.5	1.5	3.5	.5	2.0	11.0	6.5	8.5	18.5	12.5	15.5
22	3.0	1.0	2.0	4.0	.0	2.0	12.0	7.5	10.0	19.5	14.0	16.5
23	2.0	1.5	2.0	2.0	1.5	2.0	11.0	4.0	7.0	19.0	14.0	16.5
24	2.0	.5	1.0	2.5	1.5	2.0	4.0	2.0	2.5	19.0	13.5	16.0
25	.5	.0	.0	4.5	1.5	2.5	7.0	2.5	4.5	17.0	13.5	15.0
26	.0	.0	.0	5.0	.5	2.5	7.0	5.5	6.5	16.0	10.5	13.0
27	.5	.0	.0	2.5	1.5	2.0	9.5	5.5	7.5	15.5	11.0	13.5
28	.0	.0	.0	5.0	2.0	3.0	9.0	7.0	7.5	18.0	12.0	15.0
29	.0	.0	.0	5.5	1.5	3.0	9.0	7.0	8.0	16.5	12.5	14.5
30	---	---	---	5.5	.5	2.5	12.5	8.5	10.5	14.5	13.0	13.5
31	---	---	---	5.0	.5	2.5	---	---	---	15.0	11.5	13.0
MONTH	3.0	.0	.5	5.5	.0	1.5	12.5	.0	4.0	19.5	7.0	12.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	12.0	9.5	11.0	17.5	13.5	15.0	19.0	13.5	16.0			
2	14.0	10.5	12.0	18.5	11.5	15.0	18.0	15.5	16.5			
3	15.0	9.5	12.5	20.0	12.0	16.0	18.0	13.0	15.5			
4	16.0	10.0	13.0	19.0	14.0	16.5	15.5	14.0	15.0			
5	12.5	11.0	11.5	16.0	13.5	15.0	18.5	14.5	16.5			
6	16.5	10.5	13.5	18.5	11.5	15.0	20.0	14.0	17.0			
7	14.0	10.5	12.5	20.5	13.5	17.0	20.5	15.5	18.0			
8	11.5	8.5	10.0	20.0	14.5	17.0	20.5	16.5	18.0			
9	13.5	8.5	11.0	20.5	15.0	17.5	19.0	15.5	17.0			
10	13.5	9.0	11.0	21.0	15.0	18.0	18.0	15.5	17.0			
11	16.0	9.0	12.5	21.0	16.5	18.5	17.5	15.5	16.5			
12	17.0	10.5	14.0	20.5	15.0	17.5	19.0	14.5	16.5			
13	16.5	13.0	14.5	19.5	15.0	17.5	16.5	15.5	16.0			
14	14.5	12.5	13.5	19.5	16.0	17.5	17.5	15.5	16.5			
15	15.5	11.0	13.0	21.0	16.5	18.5	17.0	13.0	15.0			
16	15.5	10.0	12.5	20.0	16.5	18.0	17.5	12.5	15.0			
17	17.0	11.0	14.0	19.0	15.0	17.0	16.0	14.5	15.0			
18	15.0	12.5	13.5	17.0	15.0	16.0	18.5	14.5	16.0			
19	17.0	11.5	14.0	20.5	15.0	17.5	16.0	12.5	13.5			
20	17.5	11.0	14.5	18.0	16.5	17.0	14.5	13.0	13.5			
21	16.0	12.0	14.0	20.0	15.0	17.5	17.0	14.0	15.5			
22	18.0	12.0	15.0	19.5	15.0	17.0	15.5	12.5	14.0			
23	20.5	12.5	16.5	20.5	14.0	17.0	15.0	12.5	14.0			
24	20.5	14.0	17.0	20.5	14.5	17.5	14.5	12.5	13.5			
25	21.0	15.0	18.0	18.0	16.0	17.0	15.5	12.5	14.0			
26	20.0	16.0	17.5	19.5	13.5	16.0	15.5	14.0	14.5			
27	16.0	13.5	14.5	19.5	12.5	16.0	17.5	13.0	15.0			
28	16.5	13.0	14.5	19.0	14.0	16.5	---	---	---			
29	14.5	13.0	14.0	20.0	14.5	17.0	---	---	---			
30	16.5	12.5	14.5	17.0	14.0	15.5	---	---	---			
31	---	---	---	18.0	14.0	16.0	---	---	---			
MONTH	21.0	8.5	13.5	21.0	11.5	17.0						

04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI

LOCATION.--Lat 46°17'10", long 87°26'00", in NE¼ sec.21, T.45 N., R.25 W., Marquette County, Hydrologic Unit 04030110, on right bank in county park at Gwinn, 1.1 mi (1.8 km) upstream from mouth.

DRAINAGE AREA.--124 mi² (321 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to September 1980 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,079.2 ft (328.94 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 16 mi (26 km) upstream. An average of 2.2 ft³/s (0.062 m³/s) was diverted from headwaters of basin by the city of Ishpeming for municipal supply and the effluent discharged to the Carp River basin. An average of 34 ft³/s (0.96 m³/s) was diverted from Schweitzer Reservoir by industry for iron ore processing, some returned to the Middle Branch Escanaba River via Green Creek and some returned to the East Branch Escanaba River via Goose Lake Outlet. Diversion into Schweitzer Reservoir from Greenwood Reservoir via Greenwood Diversion (station 04057813). Some mine water pumped into basin at headwaters.

AVERAGE DISCHARGE.--23 years (water years 1955-77), 111 ft³/s (3.144 m³/s), 12.16 in/yr (309 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,390 ft³/s (67.7 m³/s) June 1, 1970, gage height, 14.97 ft (4.563 m); minimum, 19 ft³/s (0.54 m³/s) July 30, Oct. 11, 1963; minimum gage height, 6.46 ft (1.969 m) Sept. 14, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 530 ft³/s (15.0 m³/s) Apr. 10, gage height, 9.82 ft (2.993 m); minimum, 30 ft³/s (0.85 m³/s) Aug. 23, 24, gage height, 6.65 ft (2.027 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	48	279	140	74	76	63	128	141	70	51	41	44
2	48	288	130	74	74	62	138	130	68	56	41	54
3	48	249	125	72	78	64	142	119	65	56	40	51
4	52	213	115	72	76	64	137	109	58	46	39	52
5	50	198	112	70	75	63	153	102	53	44	46	47
6	49	195	110	70	74	61	180	98	55	45	59	43
7	50	177	106	73	79	62	229	98	54	45	88	40
8	49	149	105	75	73	56	307	99	58	49	75	39
9	55	137	100	73	72	55	446	92	59	45	61	41
10	60	123	101	73	70	56	519	94	56	41	49	41
11	59	120	99	83	71	54	433	89	61	41	45	40
12	59	110	103	83	70	54	337	85	61	41	44	40
13	78	122	102	80	69	56	274	79	55	40	43	72
14	89	128	93	81	66	56	230	76	68	42	46	121
15	84	125	91	80	69	56	201	74	75	50	43	95
16	84	124	84	97	66	60	176	70	68	45	41	81
17	71	121	88	117	64	64	162	68	60	41	40	74
18	58	121	85	111	66	59	198	68	56	37	39	71
19	56	119	82	106	64	60	248	70	56	42	37	72
20	57	122	82	101	64	72	263	73	51	47	33	69
21	67	121	82	91	65	80	258	67	49	58	34	177
22	157	141	83	96	65	80	242	66	48	60	32	296
23	367	153	84	87	65	79	221	58	49	53	31	248
24	389	152	89	85	64	74	201	55	49	47	32	160
25	350	141	90	88	62	71	189	51	48	53	45	130
26	259	145	87	84	63	102	184	48	47	57	41	130
27	221	180	86	81	62	84	181	47	47	49	38	121
28	278	170	82	80	62	83	166	46	47	47	41	107
29	280	152	80	78	61	85	157	44	48	45	40	94
30	265	150	77	76	---	100	154	45	51	42	39	85
31	229	---	74	79	---	117	---	59	---	41	39	---
TOTAL	4066	4725	2967	2590	1985	2152	6854	2420	1690	1456	1362	2735
MEAN	131	158	95.7	83.5	68.4	69.4	228	78.1	56.3	47.0	43.9	91.2
MAX	389	288	140	117	79	117	519	141	75	60	88	296
MIN	48	110	74	70	61	54	128	44	47	37	31	39

CAL YR 1979 TOTAL 54273 MEAN 149 MAX 1290 MIN 45
WTR YR 1980 TOTAL 35002 MEAN 95.6 MAX 519 MIN 31

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1955 to November 1980 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT									
30...	1015	276	130	7.5	5.0	70	2.0	50	13
NOV									
29...	1515	147	260	7.6	1.0	50	2.0	51	14
DEC									
18...	0945	84	400	7.2	.0	30	2.0	60	17
JAN									
30...	0930	74	350	7.4	.0	40	4.0	58	16
FEB									
27...	0940	67	423	7.7	.0	30	2.5	62	17
MAR									
26...	1030	168	344	7.6	1.0	10	3.5	63	17
APR									
30...	1445	153	127	7.4	10.0	30	1.2	54	15
MAY									
27...	1115	46	169	7.8	15.0	28	1.9	70	19
JUN									
18...	1530	55	362	7.9	15.0	50	2.0	58	16
AUG									
05...	0945	47	400	8.0	17.0	15	2.1	54	15
27...	1545	36	174	7.8	18.0	30	1.8	70	19
SEP									
25...	1335	121	235	7.6	9.0	45	.80	54	14

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
OCT								
30...	4.2	.15	740	--	390	30	10	20
NOV								
29...	3.8	.30	650	--	270	60	10	50
DEC								
18...	4.3	.23	620	350	270	100	0	100
JAN								
30...	4.5	.17	730	450	280	90	0	90
FEB								
27...	4.8	1.1	780	470	310	100	10	90
MAR								
26...	5.1	.29	910	670	240	130	40	90
APR								
30...	4.0	.16	560	270	290	40	10	30
MAY								
27...	5.4	.07	670	320	350	50	10	40
JUN								
18...	4.4	.08	610	340	270	60	20	40
AUG								
05...	4.1	.05	640	320	320	60	30	30
27...	5.5	.08	720	250	470	50	20	30
SEP								
25...	4.6	.14	660	330	330	40	10	30

04058500 EAST BRANCH ESCANABA RIVER AT GWINN, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV 05...	1410	64	481	7.9	3.5	20	.80	52	14

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV 05...	4.1	.16	570	280	290	50	20	30

04059000 ESCANABA RIVER AT CORNELL, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°54'31", long 87°12'49", in NW¼ sec.32, T.41 N., R.23 W., Delta County, Hydrologic Unit 04030110, on right bank 50 ft (15 m) downstream from bridge on County Road 519, 0.4 mi (0.6 km) downstream from Bobs Creek, 0.7 mi (1.1 km) northeast of Cornell, and 16 mi (26 km) upstream from mouth.

DRAINAGE AREA.--870 mi² (2,253 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1903 to December 1912, January 1913 to November 1915 (gage heights only), October 1950 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Escanaba" 1903-15.

REVISED RECORDS.--WSP 1387: 1904.

GAGE.--Water-stage recorder. Datum of gage is 749.26 ft (228.374 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). August 1903 to November 1915, nonrecording gage at site 10 mi (16 km) downstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period and those for period of no gage-height record, Oct. 20 to Dec. 12, which are fair. Since 1950, diurnal fluctuation and occasional slight regulation caused by Boney Falls powerplant 7 mi (11 km) upstream. Since August 1962, some regulation by Schweitzer Reservoir (station 04058190) about 50 mi (80 km) upstream. Since December 1972, some regulation by Greenwood Reservoir (station 04057811) about 60 mi (97 km) upstream.

AVERAGE DISCHARGE.--39 years, (water years 1904-12, 1951-80), 891 ft³/s (25.23 m³/s), 13.91 in/yr (353 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 26, 1979, gage height, 5.00 ft (1.524 m); maximum gage height, 6.40 ft (1.951 m) Apr. 9, 1971, backwater from ice; minimum discharge observed, 90 ft³/s (2.55 m³/s) July 5, 1910, gage height, 1.5 ft (0.46 m), site and datum then is use, but may have been less during extended periods of no gage-height record during winter periods of 1903-12, or periods of ice effect in 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,930 ft³/s (111 m³/s) Apr. 9, gage height, 3.41 ft (1.039 m); maximum gage height, 3.98 ft (1.213 m) Jan. 16, backwater from ice; minimum discharge, 185 ft³/s (5.24 m³/s) Aug. 4, gage height, 1.30 ft (0.396 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	320	1600	800	500	420	280	820	1530	443	320	275	462
2	330	1600	760	440	420	270	1000	1420	517	298	289	516
3	354	1600	640	430	400	270	1050	1290	832	303	265	584
4	361	1600	800	300	390	270	1100	1180	490	329	251	563
5	399	1500	840	340	400	270	1200	1150	484	297	277	552
6	405	1450	750	410	390	270	1400	978	529	268	303	525
7	364	1450	720	380	380	270	1680	891	551	359	437	430
8	374	1300	450	330	390	270	2110	866	508	394	541	402
9	386	1000	700	360	390	280	3310	848	542	427	461	396
10	411	1100	780	420	390	280	3750	796	689	406	395	391
11	459	1000	650	440	390	280	3370	856	581	392	370	379
12	435	900	520	420	420	280	2790	794	659	364	356	378
13	472	600	550	430	360	280	2140	770	562	286	357	499
14	518	650	580	450	350	270	1870	708	472	313	430	1100
15	547	800	550	480	350	260	1640	673	474	377	433	1400
16	661	720	470	600	360	260	1460	626	480	340	386	1300
17	579	740	350	860	360	260	1410	584	524	330	294	1150
18	456	750	420	650	350	290	1370	574	455	357	293	1100
19	472	750	600	550	340	330	1540	535	457	351	299	1020
20	400	730	540	550	320	390	1730	529	433	397	310	891
21	430	800	570	510	330	420	1930	459	398	451	295	1310
22	450	900	560	490	350	450	2010	446	354	473	239	2190
23	1000	1050	550	480	340	440	2060	458	342	430	244	2350
24	1900	1200	570	470	340	410	2010	408	333	425	247	2140
25	2100	1150	540	460	330	440	1900	368	299	416	253	1900
26	2200	1000	520	450	320	410	1870	341	298	361	499	1710
27	2400	1150	450	450	310	480	1740	344	290	438	680	1550
28	2400	1150	500	450	300	520	1650	323	297	710	687	1390
29	2100	1150	480	450	300	540	1550	315	327	451	646	1210
30	1800	1000	470	450	---	580	1580	337	324	297	552	1060
31	1600	---	530	440	---	700	---	413	---	289	459	---
TOTAL	27083	32390	18210	14360	10490	11020	55040	21810	13944	11649	11823	30848
MEAN	874	1080	587	463	362	355	1835	704	465	376	381	1028
MAX	2400	1600	840	860	420	700	3750	1530	832	710	687	2350
MIN	320	600	350	300	300	260	820	315	290	268	239	378
CFSM	1.01	1.24	.68	.53	.42	.41	2.11	.81	.53	.43	.44	1.18
IN.	1.16	1.38	.78	.61	.45	.47	2.35	.93	.60	.50	.51	1.32

CAL YR 1979 TOTAL 443078 MEAN 1214 MAX 10200 MIN 320 CFSM 1.40 IN 18.95
WTR YR 1980 TOTAL 258667 MEAN 707 MAX 3750 MIN 239 CFSM .81 IN 11.06

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1969-73, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1975 to current year.
WATER TEMPERATURES: February 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since October 1975.

REMARKS.--Monthly samples were collected as a cross-section sample in the reach of stream from the bridge on County Road 519 to a point 200 ft (61 m) downstream. Interruptions in the daily record were due to malfunctions of the instrument. Complete ice cover during winter period. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (Water years 1975-76, 1978-80): Maximum daily, 360 micromhos Sept. 10, 1975; minimum daily, 115 micromhos Apr. 24, 25, 1975, Sept. 13, 1978.
WATER TEMPERATURES: Maximum daily, 35.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum recorded, 296 micromhos Sept. 13; minimum observed, 122 micromhos Apr. 15.
WATER TEMPERATURES: Maximum, 30.5°C July 15, 19; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
NOV												
13...	1400	505	148	7.9	1.0	14.0	101	K3	16	68	5	17
DEC												
12...	1245	514	194	7.8	.0	14.7	14	K1	K3	78	0	19
JAN												
09...	1230	400	247	8.0	.0	14.6	101	K1	<1	100	0	24
FEB												
12...	1300	386	252	8.0	.0	12.9	90	K1	<1	94	0	23
MAR												
13...	1315	278	235	7.9	.0	12.7	89	K1	K1	93	0	22
APR												
15...	1300	1660	122	7.9	2.0	13.6	101	K2	K2	57	6	14
MAY												
13...	1130	772	155	8.0	8.0	11.9	103	K1	K5	76	10	18
JUN												
11...	1200	522	160	8.2	17.5	10.6	112	--	K440	78	8	18
JUL												
08...	1215	346	228	8.3	24.0	9.7	118	K10	260	93	0	22
AUG												
14...	1130	378	219	8.3	20.0	10.2	115	20	22	92	0	22
SEP												
18...	1030	1190	170	7.9	11.0	10.3	95	29	50	80	17	19

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM AD-SORPTION RATIO	SODIUM PERCENT	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV											
13...	6.3	0	3.0	.2	13	.8	77	0	63	2.0	7.6
DEC											
12...	7.4	0	8.6	.4	28	1.0	98	0	80	2.5	13
JAN											
09...	10	0	13	.6	32	1.1	140	0	115	2.2	19
FEB											
12...	8.9	--	17	.8	28	1.2	130	0	107	2.1	20
MAR											
13...	9.3	0	15	.7	26	1.0	130	0	107	2.6	19
APR											
15...	5.3	0	2.0	.1	7	.9	62	0	51	1.2	7.6
MAY											
13...	7.6	0	3.5	.2	9	.7	92	0	75	1.3	8.4
JUN											
11...	8.0	--	3.4	.2	9	.6	96	0	79	.9	7.8
JUL											
08...	9.2	0	12	.5	22	1.0	120	0	98	1.0	16
AUG											
14...	8.9	0	9.9	.5	19	1.0	120	0	92	.9	13
SEP											
18...	7.9	--	4.5	.2	11	.7	88	0	63	1.5	8.5

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
NOV											
13...	3.3	.1	7.0	127	85	173	.29	.24	--	.050	.02
DEC											
12...	4.3	.0	9.3	128	112	178	.23	.18	--	.030	.02
JAN											
09...	5.2	.2	12	163	156	176	--	.36	--	.010	.00
FEB											
12...	5.7	.2	13	165	154	172	--	.22	--	.060	.06
MAR											
13...	4.9	.1	12	154	148	116	.26	.24	--	.060	.06
APR											
15...	2.6	.1	5.2	96	70	430	--	.24	--	.030	.02
MAY											
13...	3.0	.1	4.7	112	86	233	--	.14	--	.040	.02
JUN											
11...	2.4	.1	5.2	103	89	145	.06	.06	.040	.010	.05
JUL											
08...	4.5	.1	7.6	136	132	127	--	.09	.010	.010	.01
AUG											
14...	4.0	.1	9.1	154	124	157	--	.09	--	.030	.00
SEP											
18...	3.0	.1	9.6	143	92	459	--	.12	--	.050	.01

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV											
13...	.44	.46	.75	3.3	.020	.06	.010	--	1	1.4	100
DEC											
12...	.31	.33	.56	2.5	.010	.03	.000	8.8	--	--	--
JAN											
09...	.81	.81	1.1	4.9	.020	.06	.000	--	--	--	--
FEB											
12...	.41	.46	.67	3.0	.020	.06	.010	3.6	1	1.0	100
MAR											
13...	.19	.24	.50	2.2	.010	.03	.000	--	2	1.5	100
APR											
15...	.26	.28	.49	2.2	.030	.09	.010	--	4	18	100
MAY											
13...	.65	.68	.81	3.6	.020	.06	.010	11	8	17	100
JUN											
11...	.39	.43	.49	2.2	.010	.03	.000	7.3	7	9.9	100
JUL											
08...	.27	.28	.35	1.6	--	.06	.080	--	8	7.5	100
AUG											
14...	.49	.49	.56	2.5	.020	.06	.000	10	5	5.1	100
SEP											
18...	.53	.54	.65	2.9	.000	.00	.000	24	8	26	100

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
NOV										
13...	1400	1	1	--	20	1	1	20	<10	3
JAN										
09...	1230	1	1	100	20	--	0	10	10	--
APR										
15...	1300	1	1	<50	20	--	1	180	10	3
JUL										
08...	1215	1	0	<50	20	0	0	10	<10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
NOV										
13...	1	2	2	--	540	9	1	50	40	.4
JAN										
09...	0	--	2	720	400	--	0	40	20	.1
APR										
15...	0	9	1	1600	290	2	0	40	10	.1
JUL										
08...	0	4	2	490	130	2	1	70	10	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
NOV										
13...	.3	2	0	0	0	0	10	5	12	.1
JAN										
09...	<.1	--	0	0	0	0	70	10	5.4	.1
APR										
15...	.1	100	1	0	0	0	10	9	13	.3
JUL										
08...	.2	9	0	0	0	0	10	7	11	.5

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
DEC							
12...	1245	29	.00	.000	.000	.080	.000
FEB							
12...	1300	34	--	.000	.080	.000	.000
MAY							
13...	1130	28	581	.000	.157	.270	.000

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 22,78	MAR 27,79	APR 18,79	MAY 30,79	JUL 3,79
TIME	1200	1330	1230	1115	1300
TOTAL CELLS/ML	1000	190	14	26	390
DIVERSITY: DIVISION	0.9	1.2	0.0	0.0	0.8
.CLASS	0.9	1.2	0.0	0.0	0.8
..ORDER	1.2	2.3	0.0	0.0	0.8
...FAMILY	1.6	3.2	0.0	0.0	1.5
....GENUS	1.6	3.3	0.0	0.0	2.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	26	7
....CHODATELLA	14	1	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	13	3
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	20	11	--	-	--	-	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....BINUCLEARIA	--	-	20	11	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	15	8	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	45#	24	--	-	--	-	26	7
....MELOSIRA	--	-	--	-	--	-	--	-	52	13
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	14	1	5	3	--	-	--	-	52	13
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	97	9	25	14	--	-	26#	100	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	5	3	--	-	--	-	52	13
....SYNEDRA	42	4	5	3	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	26	7
...MERIDIONACEAE										
....MERIDION	--	-	10	5	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	55	5	5	3	14#	100	--	-	52	13
...NITZSCHIACEAE										
....NITZSCHIA	14	1	15	9	--	-	--	-	64#	17
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	69	7	--	-	--	-	--	-	26	7
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	720#	70	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	15	8	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 31,79	AUG 22,79	SEP 26,79	DEC 12,79	MAR 13,80
TIME	1045	1345	1400	1245	1315
TOTAL CELLS/ML	280	830	90	140	410
DIVERSITY: DIVISION	1.4	1.1	1.0	0.7	0.5
.CLASS	1.4	1.1	1.0	0.7	0.5
..ORDER	1.7	1.3	1.4	0.7	0.7
...FAMILY	2.2	1.4	2.0	1.2	2.6
....GENUS	2.2	1.5	2.0	1.2	2.6

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	26#	29	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	26	9	--	-	--	-	10	7	5	1
....CHLORELLA	--	-	--	-	--	-	--	-	10	2
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	26#	29	--	-	--	-
....OOCYSTIS	--	-	13	2	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	130#	45	26	3	--	-	20	14	30	7
..ULOTRICHALES										
...ULOTRICHACEAE										
....BINUCLEARIA	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	26	9	52	6	26#	29	--	-	10	2
....MELOSIRA	--	-	26	3	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	13	2	--	-	--	-	65#	16
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	10	2
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	110#	75	170#	42
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	13	5	--	-	--	-	--	-	55	14
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	25	6
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	--	-	5	1
...NITZSCHIACEAE										
....NITZSCHIA	39	14	--	-	13	14	5	4	20	5
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	52	6	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	51#	18	26	3	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	620#	75	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 13,80		JUN 11,80		JUL 8,80		AUG 14,80		SEP 18,80	
TIME	1130		1200		1215		1130		1030	
TOTAL CELLS/ML	130		210		870		220		330	
DIVERSITY: DIVISION	0.5		1.5		1.2		1.5		1.2	
.CLASS	0.5		1.5		1.3		1.5		1.2	
..ORDER	0.9		1.9		1.4		2.0		1.2	
...FAMILY	1.8		2.8		2.0		2.1		1.4	
....GENUS	2.3		2.8		2.2		2.1		1.4	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	530#	60	--	-	51#	15
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	26	13	26	3	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	26	3	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	51#	25	26	3	100#	47	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....BINUCLEARIA	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	26	13	--	-	13	6	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13	10	--	-	39	4	26	12	--	-
....MELOSIRA	--	-	--	-	26	3	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	13	10	39#	19	51	6	--	-	26	8
...CYMBELLACEAE										
....CYMBELLA	13	10	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	52#	40	--	-	--	-	--	-	--	-
....FRAGILARIA	26#	20	--	-	--	-	13	6	--	-
....SYNEDRA	--	-	13	6	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	13	4
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	26	3	--	-	13	4
...NITZSCHIACEAE										
....NITZSCHIA	--	-	26	13	13	1	13	6	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	13	1	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	13	6	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	13	10	13	6	100	12	51#	24	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	230#	69
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	220	214	217	196	178	184	---	---	---	259	255	257
2	221	216	219	179	170	174	---	---	---	262	258	260
3	224	220	221	176	168	173	---	---	---	263	254	258
4	224	220	222	177	168	172	237	203	214	268	257	262
5	222	220	220	177	175	176	215	202	209	272	252	264
6	222	213	218	178	173	176	224	205	210	266	258	261
7	219	214	217	181	175	179	---	---	---	---	242	---
8	221	217	219	181	172	177	---	---	---	255	247	251
9	224	220	222	186	176	182	236	213	220	256	243	246
10	225	221	223	190	176	182	223	213	217	247	243	245
11	227	222	225	196	188	191	224	216	220	247	241	243
12	228	218	222	191	180	185	233	221	226	250	244	247
13	225	219	222	198	179	189	233	223	228	249	243	245
14	224	203	213	198	189	192	232	218	226	246	242	244
15	209	203	206	193	183	188	233	216	225	246	244	245
16	216	207	211	---	---	---	231	218	224	249	236	243
17	210	196	203	183	180	181	243	232	237	251	228	237
18	205	196	201	186	180	182	247	231	240	235	223	229
19	217	206	209	187	180	183	232	222	228	222	209	214
20	214	207	211	189	184	186	232	224	227	221	217	219
21	242	214	224	194	182	188	243	230	234	233	222	227
22	234	216	224	194	185	189	---	---	---	233	225	229
23	221	193	210	192	149	173	---	---	---	239	233	235
24	192	170	180	153	132	139	---	---	---	237	232	235
25	173	156	163	152	129	135	244	241	243	240	236	238
26	163	156	160	159	138	144	239	232	234	239	236	238
27	168	162	165	154	141	148	266	247	257	242	238	240
28	170	161	168	198	153	177	266	253	258	244	242	243
29	169	160	165	---	---	---	259	246	256	244	243	244
30	171	164	167	---	---	---	258	244	254	245	240	244
31	191	169	174	---	---	---	260	246	255	245	241	243
MONTH	242	156	204									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	242	236	239	246	244	245	227	209	217	---	---	---
2	239	232	237	247	246	247	229	190	210	---	---	---
3	236	234	235	247	245	246	219	214	217	---	---	---
4	237	233	236	247	246	246	218	197	208	---	---	---
5	240	237	239	248	246	247	203	185	194	---	---	---
6	242	239	241	254	246	249	185	174	180	---	---	---
7	242	241	241	249	245	247	205	166	183	---	---	---
8	243	240	241	248	244	247	224	200	209	---	---	---
9	244	241	242	247	243	246	207	153	172	---	---	---
10	245	243	244	246	244	244	168	135	141	---	---	---
11	244	242	243	247	244	246	---	---	---	---	---	---
12	247	241	244	246	240	244	---	---	---	---	---	---
13	246	244	245	241	238	238	---	---	---	---	192	---
14	248	245	246	240	236	238	---	---	---	200	192	197
15	247	244	246	241	238	240	---	---	---	199	195	197
16	247	245	246	241	238	241	---	---	---	200	194	197
17	247	244	246	243	238	241	---	---	---	201	196	198
18	246	243	244	245	241	243	---	---	---	202	199	200
19	244	241	243	244	214	235	---	---	---	206	201	204
20	243	241	242	245	223	236	---	---	---	210	203	207
21	243	241	242	247	234	242	---	---	---	220	205	213
22	244	241	243	241	233	237	---	---	---	218	212	215
23	246	243	244	237	234	236	---	---	---	218	211	214
24	245	243	244	235	234	234	---	---	---	224	216	220
25	246	243	244	236	232	234	---	---	---	227	220	223
26	246	244	246	241	233	237	---	---	---	228	220	224
27	245	242	244	244	241	243	---	---	---	228	218	223
28	246	243	244	244	236	240	---	---	---	227	220	223
29	246	242	244	246	233	240	---	---	---	223	218	220
30	---	---	---	244	228	236	---	---	---	223	218	220
31	---	---	---	239	220	231	---	---	---	233	220	226
MONTH	248	232	243	254	214	241						

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	236	219	227	249	240	249	228	220	224	264	254	258
2	226	217	221	244	235	244	235	223	---	257	233	246
3	214	204	207	243	237	---	239	232	---	240	234	238
4	218	205	212	239	229	---	244	236	---	241	231	236
5	211	192	201	243	225	232	279	262	---	232	220	225
6	217	204	209	238	225	---	282	266	---	229	219	222
7	210	202	207	245	225	---	---	276	---	242	230	236
8	214	207	210	240	228	---	---	277	---	252	241	245
9	208	199	204	243	232	---	289	258	270	274	253	267
10	202	192	195	240	231	---	261	246	251	272	247	258
11	203	184	192	237	226	231	254	242	246	268	256	260
12	193	176	183	239	220	---	257	243	249	291	269	280
13	189	177	---	237	221	---	252	246	248	296	264	283
14	205	190	---	233	224	231	249	236	242	---	---	---
15	200	190	---	235	223	230	241	233	236	---	---	---
16	207	195	---	234	224	232	252	232	---	---	---	---
17	220	200	208	235	226	232	252	244	247	---	---	---
18	213	205	---	235	223	230	262	251	255	211	199	---
19	221	204	230	243	231	234	258	249	254	214	196	---
20	218	211	222	241	230	249	257	252	254	213	204	---
21	216	214	230	243	232	256	281	252	267	---	---	---
22	227	218	230	253	242	246	270	262	265	---	---	---
23	228	218	224	249	238	243	262	255	258	208	185	---
24	228	220	227	240	234	240	266	256	---	---	---	---
25	237	222	231	239	224	235	---	269	---	---	---	---
26	233	221	239	237	220	---	---	273	---	---	---	---
27	236	225	233	224	216	219	---	289	---	---	---	---
28	247	234	248	220	209	---	288	272	278	---	---	---
29	248	231	236	235	211	---	292	274	284	---	---	---
30	261	232	246	234	220	---	294	278	288	---	---	---
31	---	---	---	239	221	---	281	261	268	---	---	---
MONTH	248	176		253	209			220				

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.0	11.0	13.0	7.0	4.0	5.0	.0	.0	.0	.0	.0	.0
2	16.5	11.5	13.5	6.0	2.5	4.0	.0	.0	.0	.0	.0	.0
3	14.0	11.0	12.5	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
4	14.0	9.5	11.5	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
5	14.0	7.5	10.5	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
6	11.0	9.0	10.0	4.5	2.0	3.0	.0	.0	.0	.0	.0	.0
7	12.5	7.0	9.5	3.5	1.5	2.5	.0	.0	.0	.0	.0	.0
8	9.0	7.0	8.0	2.0	.5	1.5	.0	.0	.0	.0	.0	.0
9	10.5	6.5	7.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
10	11.5	5.5	7.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
11	8.5	5.5	7.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
12	7.0	4.5	6.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
13	9.0	4.0	6.0	1.5	.0	.5	.0	.0	.0	.0	.0	.0
14	6.0	2.0	4.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
15	9.5	3.0	5.5	.5	.0	.0	.0	.0	.0	.0	.0	.0
16	10.5	2.0	5.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
17	11.5	5.0	7.5	2.0	.0	.5	.0	.0	.0	.0	.0	.0
18	9.5	3.5	6.0	2.5	.0	.5	.0	.0	.0	.0	.0	.0
19	11.5	7.0	9.5	3.5	.0	1.5	.0	.0	.0	.0	.0	.0
20	13.0	7.0	10.0	2.0	.5	1.0	.0	.0	.0	.0	.0	.0
21	12.0	10.0	11.0	1.5	.0	.5	.0	.0	.0	.0	.0	.0
22	10.0	7.0	9.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
23	7.5	4.5	6.5	1.5	.0	.5	.0	.0	.0	.0	.0	.0
24	7.0	4.5	5.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
25	4.5	3.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
26	3.5	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
27	4.5	2.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
28	4.5	2.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
29	4.0	1.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	6.0	1.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	7.5	2.5	4.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	16.5	1.0	7.5	7.0	.0	1.0	.0	.0	.0	.0	.0	.0

04059000 ESCANABA RIVER AT CORNELL, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.0	.0	.0	8.5	6.0	7.0
2	.0	.0	.0	.0	.0	.0	.0	.0	.0	10.0	6.5	8.5
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	10.0	7.0	8.5
4	.0	.0	.0	.0	.0	.0	.0	.0	.0	10.5	7.5	9.0
5	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.0	8.5	10.5
6	.0	.0	.0	.0	.0	.0	.0	.0	.0	11.5	8.0	9.5
7	.0	.0	.0	.0	.0	.0	.5	.0	.0	8.5	6.5	7.5
8	.0	.0	.0	.0	.0	.0	1.0	.0	.5	8.5	6.5	7.0
9	.0	.0	.0	.0	.0	.0	.5	.0	.5	9.0	6.0	7.0
10	.0	.0	.0	.0	.0	.0	1.0	.5	.5	9.0	6.0	7.0
11	.0	.0	.0	.0	.0	.0	1.0	.0	.5	10.5	7.0	8.5
12	.0	.0	.0	.0	.0	.0	1.5	.5	1.0	11.5	6.5	9.0
13	.0	.0	.0	.0	.0	.0	1.0	.5	1.0	11.0	7.5	9.0
14	.0	.0	.0	.0	.0	.0	1.5	.5	1.0	10.5	7.0	8.5
15	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	14.0	6.5	10.0
16	.0	.0	.0	.0	.0	.0	3.5	.5	1.5	16.5	7.0	11.0
17	.0	.0	.0	.0	.0	.0	4.5	1.5	2.5	15.0	9.0	12.0
18	.0	.0	.0	.0	.0	.0	5.5	1.5	4.0	18.5	11.5	14.0
19	.0	.0	.0	.0	.0	.0	6.0	3.5	4.5	20.0	11.5	15.5
20	.0	.0	.0	.0	.0	.0	6.5	3.5	5.0	22.5	12.0	16.5
21	.0	.0	.0	.0	.0	.0	6.5	4.5	5.5	24.5	13.0	18.0
22	.0	.0	.0	.0	.0	.0	7.5	5.0	6.0	25.0	14.0	19.0
23	.0	.0	.0	.0	.0	.0	7.5	4.5	5.5	26.0	15.5	20.0
24	.0	.0	.0	.0	.0	.0	4.5	4.0	4.0	26.0	15.5	20.0
25	.0	.0	.0	.0	.0	.0	5.0	3.5	4.0	25.0	16.0	19.5
26	.0	.0	.0	.0	.0	.0	6.0	4.0	5.0	23.5	13.0	17.5
27	.0	.0	.0	.0	.0	.0	7.0	4.5	5.5	21.5	13.5	17.0
28	.0	.0	.0	.0	.0	.0	6.0	4.5	5.5	25.0	14.0	19.0
29	.0	.0	.0	.0	.0	.0	6.0	5.0	5.5	23.5	14.5	18.5
30	---	---	---	.0	.0	.0	7.5	5.5	6.5	19.0	16.5	17.5
31	---	---	---	.0	.0	.0	---	---	---	20.0	15.0	17.0
MONTH	.0	.0	.0	.0	.0	.0	7.5	.0	2.5	26.0	6.0	13.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.0	12.0	14.5	24.0	17.0	19.0	29.5	18.5	23.5	20.0	17.5	18.5
2	18.0	13.0	15.0	27.5	14.5	20.5	27.0	20.0	22.5	20.5	16.5	18.0
3	19.0	13.5	15.5	28.0	15.5	21.5	27.5	16.5	22.5	18.0	14.0	15.5
4	23.5	12.0	17.0	27.0	18.0	22.0	21.5	15.5	19.0	20.5	14.5	16.5
5	15.0	13.0	14.0	20.0	17.5	19.5	26.5	14.5	21.0	21.0	14.0	17.0
6	22.5	13.0	17.0	27.0	15.5	20.5	27.5	18.5	21.5	22.0	14.5	17.5
7	18.5	11.5	15.0	26.0	14.5	21.0	26.5	17.5	22.0	23.0	14.5	18.0
8	16.0	10.0	12.5	27.0	18.5	22.5	25.5	19.5	22.5	23.0	16.0	19.0
9	18.5	11.5	14.0	28.0	19.5	23.0	25.5	16.0	21.5	20.5	15.5	18.0
10	16.5	10.0	13.0	29.5	19.0	23.5	25.5	20.0	22.0	21.5	13.5	17.0
11	21.0	9.5	15.0	28.0	20.0	24.0	23.0	18.0	20.0	22.0	14.0	17.5
12	21.0	12.0	16.0	28.0	18.5	22.5	26.5	18.0	21.5	16.5	15.0	15.5
13	24.0	15.0	18.5	27.5	18.0	23.0	21.0	19.0	20.0	16.5	14.5	15.5
14	20.0	15.5	17.5	25.0	20.5	22.5	24.5	18.5	21.0	15.5	14.0	14.5
15	20.0	13.5	16.0	30.5	22.0	25.0	24.5	17.0	20.0	15.0	13.5	14.0
16	23.0	11.5	16.5	27.5	21.0	23.5	24.5	15.5	19.5	14.5	12.5	14.0
17	23.0	12.5	17.5	29.0	20.0	24.0	19.5	17.0	18.5	14.5	11.5	13.0
18	18.5	15.0	16.5	23.5	20.0	22.0	27.0	18.0	21.5	13.0	11.5	12.0
19	21.5	13.0	16.5	30.5	19.5	24.0	24.5	18.0	20.5	12.0	10.0	11.0
20	23.5	12.0	17.5	23.0	20.5	21.5	24.5	19.5	21.0	13.5	11.5	12.5
21	22.0	14.5	18.0	26.5	19.5	22.0	27.5	20.0	22.5	13.0	11.5	12.0
22	25.0	15.0	19.5	24.5	18.0	20.5	27.5	17.5	22.0	13.0	11.5	12.5
23	25.5	16.5	20.5	26.5	16.5	21.0	28.0	18.0	22.5	12.0	10.5	11.5
24	25.5	17.0	21.0	26.5	18.0	22.0	22.0	17.0	20.0	12.0	10.0	11.0
25	29.0	18.5	23.5	23.0	18.0	21.0	25.0	18.0	21.5	11.5	10.0	10.5
26	27.5	18.5	22.5	26.5	16.0	20.5	21.0	17.0	19.0	10.5	9.5	10.0
27	20.0	17.0	18.5	28.0	16.0	21.5	19.0	16.0	17.0	10.5	9.0	10.0
28	24.0	16.0	19.0	26.5	18.0	21.5	17.5	16.0	16.5	10.5	8.5	9.5
29	20.0	16.0	18.0	26.5	18.5	22.0	19.0	16.5	17.5	12.0	9.5	10.5
30	23.5	15.5	19.0	24.5	17.0	20.5	20.5	17.5	18.5	12.0	11.0	11.5
31	---	---	---	28.5	18.5	23.0	21.0	16.0	18.5	---	---	---
MONTH	29.0	9.5	17.0	30.5	14.5	22.0	29.5	14.5	20.5	23.0	8.5	14.0

04059500 FORD RIVER NEAR HYDE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°45'20", long 87°12'05", in SW¼ sec.19, T.39 N., R.23 W., Delta County, Hydrologic Unit 04030109, on right bank 40 ft (12 m) downstream from bridge on County Road 533, 1.4 mi (2.3 km) downstream from Tenmile Creek, and 1.5 mi (2.4 km) north of Hyde.

DRAINAGE AREA.--450 mi² (1,166 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to current year.

GAGE.--Water-stage recorder. Datum of gage: The datum published in previous reports was in error; the correct datum is 681.77 ft (207.80 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--26 years, 383 ft³/s (10.85 m³/s), 11.56 in/yr (294 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,590 ft³/s (215 m³/s) May 7, 1960, gage height, 8.27 ft (2.521 m); minimum, 18 ft³/s (0.510 m³/s) Aug. 30, 1976, gage height, 1.33 ft (0.405 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,560 ft³/s (101 m³/s) Apr. 9, gage height, 6.10 ft (1.859 m); minimum daily, 54 ft³/s (1.53 m³/s) Mar. 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	694	388	165	110	72	185	755	160	80	74	421
2	92	706	380	155	105	68	200	728	232	73	70	363
3	90	697	375	150	105	65	220	688	267	73	68	354
4	96	703	370	145	100	62	260	633	263	69	63	372
5	100	664	360	135	96	60	400	596	250	66	148	346
6	103	671	350	130	94	58	560	553	277	61	186	307
7	102	639	307	125	92	57	720	518	293	86	339	274
8	101	597	277	125	88	55	1000	482	335	89	475	225
9	107	546	285	120	86	55	2470	454	332	85	488	225
10	111	468	276	120	85	55	2660	430	301	74	429	210
11	125	325	278	115	84	54	2440	473	261	64	355	196
12	133	343	265	110	82	55	2200	452	219	61	312	210
13	143	345	263	105	80	56	1790	423	184	59	267	294
14	139	340	253	105	80	57	1460	389	182	58	225	465
15	139	305	237	115	79	60	1160	357	176	58	193	587
16	136	269	230	130	77	64	882	329	165	63	160	635
17	134	283	220	140	76	70	755	302	152	71	138	638
18	129	277	210	155	74	82	708	282	136	64	126	605
19	131	272	200	160	74	100	728	264	155	65	112	567
20	132	276	190	165	74	120	794	245	160	82	103	535
21	158	295	195	165	74	130	855	225	149	101	104	681
22	235	364	200	170	76	130	908	205	135	176	107	966
23	505	427	210	165	78	130	943	187	123	183	105	1040
24	747	462	215	165	80	130	940	169	104	155	101	1070
25	851	466	215	155	80	130	912	153	92	125	105	1160
26	968	518	210	150	80	130	855	137	82	105	181	1190
27	1070	620	205	145	78	130	800	125	73	91	457	1080
28	1060	657	200	135	76	130	750	117	74	95	583	924
29	931	614	190	130	74	155	732	108	73	111	588	778
30	782	479	180	120	---	170	755	106	77	91	580	647
31	668	---	175	115	---	175	---	135	---	83	515	---
TOTAL	10309	14322	7909	4285	2437	2865	30042	11020	5482	2717	7757	17365
MEAN	333	477	255	138	84.0	92.4	1001	355	183	87.6	250	579
MAX	1070	706	388	170	110	175	2660	755	335	183	588	1190
MIN	90	269	175	105	74	54	185	106	73	58	63	196
CFSM	.74	1.06	.57	.31	.19	.21	2.22	.79	.41	.20	.56	1.29
IN.	.85	1.18	.65	.35	.20	.24	2.48	.91	.45	.22	.64	1.44

CAL YR 1979 TOTAL 208692 MEAN 572 MAX 4550 MIN 90 CFSM 1.27 IN 17.25
WTR YR 1980 TOTAL 116510 MEAN 318 MAX 2660 MIN 54 CFSM .71 IN 9.63

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1956 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: December 1974 to current year.
WATER TEMPERATURES: July 1956 to current year.

INSTRUMENTATION.--Temperature recorder July 1956 to September 1975. Water-quality monitor since October 1975.

REMARKS.--In addition to the water-quality monitor, samples were collected periodically by a local observer. Monthly samples were collected as a cross-section sample in reach of stream 200 ft (61 m) upstream to 200 ft (61 m) downstream from gage. Interruptions in the daily record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1979 and 1980 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum, 482 micromhos Dec. 2, 1976; minimum recorded, 131 micromhos May 22, 1976.
WATER TEMPERATURES: Maximum, 31.0°C July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum observed, 385 micromhos Mar. 12; minimum, 159 micromhos Apr. 10.
WATER TEMPERATURES: Maximum, 30.0°C July 15; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV 13...	1100	320	240	7.8	.0	14.6	101	K3	K4	130	15	30
DEC 11...	1200	259	272	7.9	.0	13.6	96	K5	K2	150	7	34
JAN 10...	1230	118	368	8.0	.0	10.7	75	K2	<1	210	9	46
FEB 11...	1330	84	375	7.8	.0	8.9	63	<1	<1	210	9	48
MAR 12...	1330	54	385	7.8	.0	8.7	60	K2	K2	210	5	46
APR 14...	1415	1450	196	8.1	1.0	13.7	99	K1	K2	85	3	20
MAY 15...	1200	369	237	8.2	6.0	11.7	98	K2	K5	140	18	32
JUN 09...	1230	355	245	8.3	14.0	10.4	103	--	K4	140	10	33
JUL 09...	1300	84	330	8.3	25.5	8.9	111	31	47	180	6	39
AUG 13...	1300	282	260	8.2	20.0	8.4	94	24	29	150	14	37
SEP 17...	1115	662	250	8.2	11.5	9.8	92	80	42	140	24	33

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
NOV 13...	13	0	1.2	.0	3	.5	140	0	115	3.6	7.6
DEC 11...	15	0	1.2	.0	3	.5	170	0	139	3.4	8.0
JAN 10...	22	0	1.6	.0	3	.8	240	0	197	3.8	14
FEB 11...	21	--	1.8	.1	2	.8	240	0	197	6.1	9.2
MAR 12...	22	0	2.0	.1	2	.8	250	0	205	6.3	14
APR 14...	8.5	0	.9	.0	2	1.0	100	0	82	1.3	5.9
MAY 15...	14	0	1.1	.0	2	.5	160	0	130	1.5	8.3
JUN 09...	14	--	1.3	.0	2	.5	170	0	140	1.3	7.2
JUL 09...	19	0	1.8	.1	2	.9	220	0	180	1.7	6.1
AUG 13...	15	0	1.2	.0	2	.5	170	0	140	1.7	7.2
SEP 17...	15	--	1.4	.1	2	.6	160	0	120	1.5	5.6

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
NOV											
13...	2.5	.1	7.5	186	132	161	--	.06	--	.020	.00
DEC											
11...	2.0	.0	7.4	180	152	126	.09	.04	--	.020	.01
JAN											
10...	2.4	.1	9.8	228	216	72.6	.15	.15	--	.010	.00
FEB											
11...	2.5	.1	10	229	212	51.9	.14	.14	.030	.030	.04
MAR											
12...	2.6	.1	10	225	222	33.3	.22	.21	.060	.000	.07
APR											
14...	2.2	.1	4.3	119	93	466	.10	.10	.140	.110	.17
MAY											
15...	1.9	.1	2.8	158	133	157	.02	.02	--	.020	.01
JUN											
09...	2.0	.1	5.4	172	142	145	.03	.02	.030	.030	.04
JUL											
09...	2.1	.1	6.6	203	178	46.0	--	.03	.010	.010	.01
AUG											
13...	2.0	.1	7.4	206	155	157	--	.01	.010	.010	.01
SEP											
17...	2.4	.1	9.4	192	160	343	--	.06	--	.020	.00

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
NOV											
13...	.63	.63	.63	2.8	.010	.03	.000	--	2	1.7	100
DEC											
11...	.54	.55	.64	2.8	.010	.03	.000	12	1	.70	100
JAN											
10...	.52	.52	.67	3.0	.010	.03	.000	--	--	--	--
FEB											
11...	.16	.19	.33	1.5	.010	.03	.000	--	3	.58	100
MAR											
12...	.22	.28	.50	2.2	.000	.00	.000	5.2	1	.15	100
APR											
14...	.36	.50	.60	2.7	.060	.18	.010	--	14	55	100
MAY											
15...	.24	.26	.28	1.2	.010	.03	.010	14	6	6.0	100
JUN											
09...	.45	.48	.51	2.3	.020	.06	.010	14	7	6.7	100
JUL											
09...	.35	.36	.37	1.6	.020	.06	.010	--	4	.91	100
AUG											
13...	.63	.64	.64	2.9	.020	.06	.010	20	4	3.0	100
SEP											
17...	.64	.64	.66	2.9	.000	--	.010	20	10	18	100

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)
NOV										
13...	1100	1	1	--	30	1	0	50	10	3
JAN										
10...	1230	1	1	200	20	--	2	30	10	0
APR										
14...	1415	0	0	<50	20	--	5	10	10	0
JUL										
09...	1300	--	2	<50	20	0	0	20	<10	0

DATE	COBALT, DIS- SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)
NOV										
13...	0	3	2	280	180	10	1	20	9	.4
JAN										
10...	0	4	2	220	130	3	0	20	6	<.1
APR										
14...	0	6	3	410	80	3	1	30	7	.1
JUL										
09...	0	2	2	150	20	1	0	40	20	.2

DATE	MERCURY DIS- SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED (MG/L AS C)
NOV										
13...	.3	4	1	0	0	0	20	20	15	.1
JAN										
10...	<.1	1	0	0	0	0	--	40	7.9	.3
APR										
14...	.1	3	3	0	0	0	20	10	--	.3
JUL										
09...	.1	0	0	0	0	0	10	0	8.9	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
DEC							
11...	1200	28	.00	.080	.080	.160	.000
FEB							
11...	1330	32	242	.000	.080	.330	.000
JUL							
09...	1300	30	305	.472	.945	1.55	.360
AUG							
13...	1300	35	330	1.10	2.13	3.12	.760

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 21.78	MAR 28.79	APR 19.79	MAY 29.79	JUL 2.79
TIME	1300	1030	1200	1300	1215
TOTAL CELLS/ML	14	140	140	51	64
DIVERSITY: DIVISION	0.0	0.7	0.9	0.0	1.9
.CLASS	0.0	0.7	0.9	0.0	1.9
..ORDER	0.0	1.0	1.6	0.0	1.9
...FAMILY	0.0	1.8	2.6	2.0	2.3
....GENUS	0.0	1.8	2.6	2.0	2.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	80#	59	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	20	15	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	10	7	14	10	--	-	13#	20
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	--	-	29#	20	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	43#	30	--	-	--	-
....COCCONEIS	--	-	5	4	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	14	10	13#	25	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	14#	100	5	4	14	10	13#	25	--	-
...NAVICULACEAE										
....NAVICULA	--	-	15	11	--	-	13#	25	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	14	10	13#	25	13#	20
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	13#	20
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	13#	20

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 21,78 1300	MAR 28,79 1030	APR 19,79 1200	MAY 29,79 1300	JUL 2,79 1215
TOTAL CELLS/ML	14	140	140	51	64
DIVERSITY: DIVISION	0.0	0.7	0.9	0.0	1.9
.CLASS	0.0	0.7	0.9	0.0	1.9
..ORDER	0.0	1.0	1.6	0.0	1.9
...FAMILY	0.0	1.8	2.6	2.0	2.3
....GENUS	0.0	1.8	2.6	2.0	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	13#	20
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	14	10	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 31,79		AUG 21,79		SEP 26,79		DEC 11,79		MAR 12,80	
TIME	1445		1430		1030		1200		1330	
TOTAL CELLS/ML	280		150		170		220		130	
DIVERSITY: DIVISION	1.2		1.2		0.4		0.0		0.5	
.CLASS	1.2		1.2		0.4		0.0		0.5	
..ORDER	2.1		1.4		0.4		0.0		1.0	
...FAMILY	2.9		1.4		0.4		0.7		2.9	
....GENUS	3.2		1.4		0.4		0.7		2.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	39	14	13	8	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	15	12
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	51#	18	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	39	14	26#	17	13	8	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	26	9	13	8	--	-	--	-	15	12
....MELOSIRA	26	9	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	30#	24
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	5	4
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	200#	89	15	12
...FRAGILARIACEAE										
....FRAGILARIA	26	9	--	-	--	-	--	-	--	-
....SYNEDRA	13	5	--	-	--	-	--	-	15	12
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	10	5	10	8
...NAVICULACEAE										
....NAVICULA	13	5	--	-	--	-	5	2	--	-
...NITZSCHIACEAE										
....NITZSCHIA	39	14	--	-	--	-	10	5	20#	16
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 31,79		AUG 21,79		SEP 26,79		DEC 11,79		MAR 12,80	
TIME	1445		1430		1030		1200		1330	
TOTAL CELLS/ML	280		150		170		220		130	
DIVERSITY: DIVISION	1.2		1.2		0.4		0.0		0.5	
.CLASS	1.2		1.2		0.4		0.0		0.5	
..ORDER	2.1		1.4		0.4		0.0		1.0	
...FAMILY	2.9		1.4		0.4		0.7		2.9	
....GENUS	3.2		1.4		0.4		0.7		2.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	100#	67	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	150#	92	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	13	5	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 15,80		JUN 9,80		JUL 9,80		AUG 13,80		SEP 17,80	
TIME	1200		1230		1300		1300		1115	
TOTAL CELLS/ML	230		490		1700		1400		660	
DIVERSITY: DIVISION	0.7		1.1		1.1		1.6		1.2	
.CLASS	0.7		1.4		1.1		1.6		1.2	
..ORDER	0.7		1.6		1.7		1.7		1.3	
...FAMILY	2.2		2.8		1.8		2.2		2.0	
....GENUS	2.2		2.9		2.0		2.2		2.0	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	290#	17	26	2	13	2
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	14	1	--	-	--	-
....OOCYSTIS	--	-	--	-	29	2	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	--	-	14	1	260#	18	26	4
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	14	3	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	14	1	39	3	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	14	1	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	14	3	14	1	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	43	9	14	1	--	-	--	-
....COCCONEIS	--	-	29	6	--	-	13	1	13	2
...CYMBELLACEAE										
....CYMBELLA	51#	22	57	12	29	2	13	1	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....FRAGILARIA	--	-	--	-	--	-	26	2	330#	51
....SYNEDRA	77#	33	--	-	--	-	39	3	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	13	6	29	6	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	51#	22	14	3	--	-	51	4	26	4
...NITZSCHIACEAE										
....NITZSCHIA	--	-	100#	21	29	2	140	10	26	4
...SURIRELLACEAE										
....CYMATOPLEURA	--	-	--	-	--	-	--	-	13	2
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	43	9	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	26	2	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	14	1	13	1	--	-

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 15,80 1200	JUN 9,80 1230	JUL 9,80 1300	AUG 13,80 1300	SEP 17,80 1115
TOTAL CELLS/ML	230	490	1700	1400	660
DIVERSITY: DIVISION	0.7	1.1	1.1	1.6	1.2
.CLASS	0.7	1.4	1.1	1.6	1.2
..ORDER	0.7	1.6	1.7	1.7	1.3
...FAMILY	2.2	2.8	1.8	2.2	2.0
....GENUS	2.2	2.9	2.0	2.2	2.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	39#	17	140#	29	1000#	59	770#	55	13	2
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	220	13	--	-	190#	29
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	300	296	297	216	208	212	258	247	253	328	326	327
2	308	299	303	217	214	216	262	258	260	330	327	328
3	310	306	308	217	214	215	268	261	264	338	332	335
4	312	305	308	215	211	213	269	266	268	344	339	341
5	316	312	314	211	209	210	269	262	264	347	344	346
6	319	316	317	217	209	214	268	261	264	348	346	347
7	321	318	320	219	217	218	270	266	268	353	349	351
8	323	320	321	220	218	219	282	270	275	354	351	352
9	322	315	318	223	220	221	284	282	283	354	352	353
10	321	317	319	230	223	227	284	278	281	358	355	356
11	325	318	321	239	230	235	281	276	278	358	357	358
12	322	319	320	244	239	241	289	280	283	357	354	356
13	320	317	318	247	238	243	293	289	291	359	355	357
14	321	319	320	256	247	251	296	292	294	360	358	359
15	320	316	318	261	253	256	299	296	298	359	356	358
16	316	313	315	266	260	263	304	300	302	356	338	352
17	315	313	314	266	261	263	311	304	308	336	325	329
18	313	310	312	263	259	261	318	311	315	332	326	329
19	310	302	306	265	261	263	320	317	319	332	330	331
20	308	302	305	270	264	268	319	315	317	332	330	331
21	308	300	303	270	268	269	316	313	314	333	331	332
22	308	290	299	270	267	269	316	314	315	333	332	333
23	293	273	285	271	267	269	316	314	315	336	333	335
24	272	243	258	268	255	261	315	311	313	341	336	339
25	241	219	231	254	244	249	315	312	313	344	341	343
26	221	206	214	244	233	237	315	313	314	346	344	345
27	224	206	214	238	236	237	318	315	316	347	345	346
28	227	201	211	236	235	236	321	318	319	349	347	347
29	200	191	193	238	235	237	324	321	322	349	348	349
30	206	193	200	246	236	241	328	325	327	350	349	349
31	210	207	208	---	---	---	327	325	326	---	---	---
MONTH	325	191	287	271	208	240	328	247	295			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	372	370	371	277	268	272	235	226	230
2	---	---	---	377	373	375	268	256	264	243	229	236
3	---	---	---	380	378	379	257	251	254	234	229	233
4	---	---	---	380	379	379	258	248	254	236	228	234
5	---	---	---	380	378	379	278	244	257	241	236	238
6	---	---	---	380	379	380	280	255	272	242	239	241
7	---	---	---	382	381	382	252	215	236	242	240	241
8	---	---	---	383	382	383	214	192	205	244	241	243
9	---	---	---	384	381	382	253	170	199	247	242	245
10	---	---	---	382	380	381	191	159	173	251	247	250
11	372	370	371	382	379	380	173	166	168	252	250	251
12	372	371	371	380	378	379	192	169	181	258	253	255
13	372	370	371	380	378	379	188	181	185	259	253	256
14	372	370	371	378	376	377	193	187	189	258	252	255
15	371	369	370	375	372	374	203	195	198	269	259	264
16	371	369	370	371	369	370	214	202	208	272	265	268
17	372	369	371	368	364	366	224	215	219	274	269	271
18	373	371	372	363	347	360	233	224	228	279	271	275
19	374	371	373	357	267	332	232	224	231	283	273	277
20	373	371	372	322	307	314	229	224	226	287	279	283
21	372	369	371	316	305	312	223	218	220	290	285	288
22	371	369	370	318	312	315	218	215	216	294	288	290
23	371	368	370	317	314	315	219	214	216	308	294	300
24	370	368	369	317	315	316	220	215	217	319	308	313
25	370	368	369	316	314	315	217	211	213	333	318	326
26	370	368	369	315	312	314	221	210	213	334	326	331
27	371	370	371	315	312	313	220	212	216	330	324	329
28	371	369	370	317	315	316	220	216	218	333	329	331
29	371	369	370	315	306	311	223	218	222	337	333	334
30	---	---	---	306	292	299	228	220	225	336	334	335
31	---	---	---	291	277	284	---	---	---	333	324	330
MONTH				384	267	349	280	159	220	337	226	276

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	330	322	326	334	331	332	---	---	---	268	264	267
2	322	310	315	339	332	335	---	---	---	273	267	270
3	311	304	308	338	332	336	---	---	---	273	268	271
4	305	295	299	342	338	339	---	---	---	273	268	270
5	295	281	290	340	328	335	---	---	---	268	266	267
6	284	281	279	327	323	325	---	---	---	271	267	269
7	279	267	275	331	314	323	---	---	---	273	270	271
8	263	255	259	320	309	315	284	269	278	281	274	278
9	250	244	246	333	322	330	277	263	269	284	276	280
10	248	244	246	339	331	335	274	267	271	295	286	290
11	252	247	249	344	335	340	271	267	269	297	292	295
12	262	255	259	344	329	336	274	258	268	295	290	292
13	273	265	269	342	337	340	273	266	269	293	287	290
14	276	272	274	348	340	343	279	276	277	290	279	286
15	281	276	278	355	347	350	288	281	285	278	273	274
16	286	280	283	356	349	352	293	283	287	274	265	271
17	292	286	289	352	336	345	297	284	289	266	262	264
18	298	290	292	348	340	343	307	293	299	264	261	262
19	297	286	290	342	334	337	315	301	309	---	---	---
20	300	289	296	340	327	333	322	315	318	---	---	---
21	301	295	298	335	330	332	326	319	322	---	---	---
22	305	299	301	337	319	328	328	319	325	---	---	---
23	316	304	308	334	331	332	328	323	326	---	---	---
24	316	311	314	336	331	333	334	322	327	---	---	---
25	321	311	315	337	334	336	333	328	330	---	---	---
26	330	321	325	338	323	331	331	309	319	---	---	---
27	328	322	325	---	---	---	307	294	302	231	226	229
28	327	321	323	---	---	---	292	272	281	231	228	229
29	329	323	327	---	---	---	272	266	270	---	---	---
30	331	329	330	---	---	---	269	265	267	---	---	---
31	---	---	---	---	---	---	268	264	266	---	---	---
MONTH	331	244	293									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.5	13.5	14.5	8.0	6.5	7.5	.0	.0	.0	.0	.0	.0
2	14.5	12.0	13.0	6.5	5.0	6.0	.0	.0	.0	.0	.0	.0
3	13.5	12.0	13.0	5.5	3.5	4.5	.0	.0	.0	.0	.0	.0
4	12.5	10.5	11.5	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
5	11.5	9.5	10.5	4.0	4.0	4.0	.5	.0	.5	.0	.0	.0
6	10.0	9.0	9.5	4.0	3.0	3.5	.5	.0	.5	.0	.0	.0
7	9.5	7.5	8.5	3.0	2.0	2.5	.5	.0	.0	.0	.0	.0
8	9.0	7.5	8.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
9	8.0	6.5	7.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
10	8.5	6.0	7.0	.0	.0	.0	.5	.0	.0	.0	.0	.0
11	7.5	6.5	7.0	.5	.0	.5	.5	.0	.0	.0	.0	.0
12	7.0	5.5	6.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
13	6.5	4.5	5.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
14	6.0	4.5	5.0	.5	.0	.5	.0	.0	.0	.0	.0	.0
15	8.0	5.0	6.5	.5	.0	.5	.0	.0	.0	.0	.0	.0
16	9.0	6.5	8.0	1.0	.0	.5	.0	.0	.0	.0	.0	.0
17	10.5	8.5	9.5	1.5	.0	.5	.0	.0	.0	.0	.0	.0
18	9.0	6.5	7.5	1.5	.0	.5	.0	.0	.0	.0	.0	.0
19	11.5	8.0	10.0	1.5	.5	.5	.0	.0	.0	.0	.0	.0
20	13.0	11.5	12.0	2.5	1.5	2.0	.0	.0	.0	.0	.0	.0
21	13.5	12.5	13.0	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
22	12.5	9.5	11.0	1.5	1.0	1.5	.0	.0	.0	.0	.0	.0
23	9.5	6.5	8.0	2.0	1.5	2.0	.0	.0	.0	.0	.0	.0
24	6.5	5.5	5.5	2.0	1.5	1.5	.0	.0	.0	.0	.0	.0
25	5.5	4.0	4.5	2.0	.5	1.0	.0	.0	.0	.0	.0	.0
26	4.5	3.5	4.0	2.0	.5	1.0	.0	.0	.0	.0	.0	.0
27	4.0	3.5	4.0	1.5	1.0	1.0	.0	.0	.0	.0	.0	.0
28	5.0	4.0	4.5	1.0	.0	.5	.0	.0	.0	.0	.0	.0
29	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0	.0	.0	.0
30	6.0	4.0	5.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
31	7.5	5.5	6.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	15.5	3.5	8.0	8.0	.0	1.5	.5	.0	.0	.0	.0	.0

04059500 FORD RIVER NEAR HYDE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	.5	.0	.0	14.5	9.5	12.0
2	.0	.0	.0	.0	.0	.0	.5	.0	.0	15.5	11.0	13.5
3	.0	.0	.0	.0	.0	.0	.0	.0	.0	16.5	11.5	14.0
4	.0	.0	.0	.0	.0	.0	.5	.0	.0	17.0	12.5	15.0
5	.0	.0	.0	.0	.0	.0	.5	.0	.5	16.0	13.5	15.0
6	.0	.0	.0	.0	.0	.0	.5	.0	.5	14.5	11.5	12.5
7	.0	.0	.0	.0	.0	.0	.5	.5	.5	11.5	8.5	9.5
8	.0	.0	.0	.0	.0	.0	1.0	.5	.5	9.0	7.5	8.5
9	.0	.0	.0	.0	.0	.0	1.0	.5	.5	10.0	7.0	8.5
10	.0	.0	.0	.0	.0	.0	1.5	.5	1.0	10.0	8.0	9.0
11	.0	.0	.0	.0	.0	.0	2.0	.5	1.0	12.0	8.0	10.0
12	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	13.0	9.0	11.0
13	.0	.0	.0	.0	.0	.0	1.5	1.0	1.0	12.5	9.5	10.5
14	.0	.0	.0	.0	.0	.0	2.0	1.0	1.5	10.5	8.5	9.5
15	.0	.0	.0	.0	.0	.0	3.0	1.0	2.0	13.5	8.0	10.5
16	.0	.0	.0	.0	.0	.0	5.0	.5	2.5	15.5	10.5	12.5
17	.0	.0	.0	.0	.0	.0	7.0	2.0	4.0	15.0	13.0	14.0
18	.0	.0	.0	.0	.0	.0	9.5	4.5	6.5	17.5	13.5	15.0
19	.0	.0	.0	.0	.0	.0	9.5	6.0	8.0	19.5	15.0	17.5
20	.0	.0	.0	.0	.0	.0	11.0	7.0	9.0	20.5	16.0	18.5
21	.0	.0	.0	.0	.0	.0	11.0	7.5	9.5	21.5	17.5	19.5
22	.0	.0	.0	.0	.0	.0	12.5	8.0	10.0	23.0	19.0	21.0
23	.0	.0	.0	.0	.0	.0	11.5	7.5	9.0	23.5	20.0	22.5
24	.0	.0	.0	.0	.0	.0	7.0	5.0	5.5	24.0	20.5	22.5
25	.0	.0	.0	.0	.0	.0	7.5	4.5	6.0	23.5	21.0	22.0
26	.0	.0	.0	.0	.0	.0	8.5	6.0	7.0	21.5	18.0	19.5
27	.0	.0	.0	.0	.0	.0	11.0	7.0	8.5	19.0	17.5	18.5
28	.0	.0	.0	.0	.0	.0	10.0	8.0	9.0	22.0	17.0	19.0
29	.0	.0	.0	.0	.0	.0	9.5	8.5	9.0	21.0	18.5	19.5
30	---	---	---	.0	.0	.0	12.5	8.5	10.5	20.0	18.5	19.0
31	---	---	---	.5	.0	.0	---	---	---	20.0	17.0	18.5
MONTH	.0	.0	.0	.5	.0	.0	12.5	.0	4.0	24.0	7.0	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	18.0	15.0	16.0	23.5	20.0	21.0	27.0	22.0	24.0	20.0	18.5	19.0
2	17.0	14.5	15.5	24.5	18.0	21.0	26.0	23.0	24.0	20.5	18.0	19.0
3	19.5	16.0	17.5	26.0	18.5	22.0	26.0	21.0	23.0	20.0	17.0	18.0
4	20.0	16.5	18.5	27.0	22.0	24.0	22.5	21.0	22.0	20.0	17.0	18.5
5	19.5	14.5	17.0	23.5	20.0	22.0	24.0	20.0	22.0	19.5	17.0	18.5
6	20.5	14.5	17.0	24.5	17.5	21.0	25.0	21.0	23.0	20.0	16.5	18.0
7	20.5	15.5	18.0	26.0	20.0	22.5	26.0	23.0	24.5	20.0	17.5	19.0
8	15.0	12.0	13.5	27.5	22.0	24.5	25.5	23.5	24.5	21.5	18.5	20.0
9	17.0	13.0	15.0	28.0	22.5	25.0	24.5	21.5	22.5	21.5	19.5	20.5
10	16.0	12.5	14.0	29.5	23.0	26.0	23.0	20.5	22.0	19.5	16.0	17.5
11	18.0	12.5	15.0	29.5	24.5	26.5	22.5	20.0	21.0	19.0	16.0	17.5
12	19.5	16.0	18.0	27.5	22.5	24.5	22.0	19.0	20.5	18.5	15.5	17.0
13	22.0	18.5	20.5	27.5	22.0	24.5	22.0	20.0	20.5	17.5	15.5	16.5
14	22.0	18.0	20.0	25.5	23.0	24.0	21.5	19.0	20.5	17.0	15.0	16.0
15	19.0	15.5	17.5	30.0	23.5	26.0	21.0	19.0	20.0	14.5	13.0	14.0
16	19.0	15.0	17.0	27.0	24.5	25.5	20.0	17.0	18.5	14.5	14.0	14.0
17	21.0	16.5	18.5	27.0	23.0	24.5	19.5	18.5	19.0	14.0	11.5	12.5
18	20.0	17.5	18.5	24.0	22.5	23.0	23.5	18.0	20.5	13.0	11.5	12.5
19	19.0	15.0	17.0	28.0	20.5	24.0	22.5	21.0	22.0	12.0	10.0	11.0
20	20.5	16.0	18.5	24.5	22.0	23.5	24.5	21.0	22.5	14.0	12.0	13.0
21	21.0	18.5	20.0	25.0	21.0	22.5	26.5	22.5	24.0	13.5	12.0	12.5
22	24.0	18.0	21.0	24.0	21.0	22.5	25.5	21.5	23.5	13.0	12.0	12.5
23	26.5	21.5	24.0	23.5	20.0	22.0	25.5	21.0	23.0	12.0	10.0	11.0
24	27.0	22.5	24.5	25.0	21.0	23.0	23.0	20.5	22.0	11.0	9.5	10.0
25	29.0	23.5	26.0	24.0	21.0	23.0	23.5	19.5	21.0	10.5	9.5	9.5
26	29.0	23.5	26.5	23.0	18.5	20.5	22.5	20.0	21.5	10.0	8.0	9.0
27	23.0	18.5	20.5	25.0	18.5	21.5	20.0	17.5	19.0	10.0	8.0	9.0
28	21.0	16.5	18.5	25.5	20.0	22.5	19.0	17.0	18.0	10.0	7.0	8.5
29	21.0	18.5	19.5	26.0	21.5	23.5	19.5	17.5	18.5	12.0	9.0	10.5
30	22.5	17.5	20.0	24.0	21.0	22.5	21.0	18.5	19.5	12.0	11.0	11.5
31	---	---	---	25.5	20.5	22.5	20.5	18.0	19.0	---	---	---
MONTH	29.0	12.0	19.0	30.0	17.5	23.5	27.0	17.0	21.5	21.5	7.0	14.5

04060500 IRON RIVER AT CASPIAN, MI

LOCATION.--Lat 46°03'31", long 88°37'38", in SE¼ SW¼ sec.1, T.42 N., R.35 W., Iron County, Hydrologic Unit 04030106, on right bank 10 ft (3 m) downstream from bridge on County Highway 424 in Caspian, and 5.0 mi (8.0 km) upstream from mouth.

DRAINAGE AREA.--92.1 mi² (238.5 km²).

PERIOD OF RECORD.--March 1948 to September 1980 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,438.78 ft (438.540 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 25, 1969, nonrecording gage at site 10 ft (3 m) upstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to August 1978, the average flow includes mine pumpage and sewage effluent. Since August 1978, average flow includes about 1 ft³/s (0.03 m³/s) sewage effluent. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 87.2 ft³/s (2.470 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) July 2, 1953, gage height, 10.20 ft (3.109 m); minimum, 25 ft³/s (0.71 m³/s) Mar. 29, 1969, gage height, 3.30 ft (1.006 m), result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 497 ft³/s (14.1 m³/s) Sept. 22, gage height, 8.46 ft (2.579 m); minimum, 58 ft³/s (1.64 m³/s) July 9, 10, gage height, 4.18 ft (1.274 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	72	157	78	73	72	66	103	92	168	69	66	91
2	76	143	80	73	74	66	109	88	122	66	64	85
3	75	121	82	72	74	66	120	85	103	63	62	90
4	75	110	83	70	76	66	112	83	88	61	65	104
5	74	107	84	71	76	64	133	81	84	65	67	86
6	72	113	84	69	77	64	179	80	90	63	62	73
7	70	107	85	70	75	64	233	80	101	62	90	69
8	69	104	80	70	75	64	296	79	118	60	89	68
9	70	97	84	70	75	64	351	78	101	59	75	119
10	72	94	83	70	75	64	243	78	88	61	67	123
11	72	88	82	70	72	64	218	90	80	67	68	97
12	71	87	79	70	68	64	175	84	76	70	67	85
13	72	85	80	71	70	64	153	79	74	67	66	129
14	71	85	80	72	72	66	137	77	75	92	67	176
15	70	87	78	73	72	67	129	76	73	89	69	150
16	69	82	79	74	70	68	123	72	69	77	65	119
17	69	81	80	74	70	68	122	72	67	72	63	99
18	68	78	74	76	70	60	132	70	73	73	64	96
19	78	84	73	76	70	66	142	70	76	76	64	92
20	85	80	74	74	66	70	142	69	71	109	68	95
21	90	91	77	72	69	78	131	68	68	104	68	317
22	197	93	78	68	70	65	127	66	67	84	65	461
23	268	94	78	64	70	68	120	68	65	73	61	359
24	232	91	79	64	71	68	113	65	65	68	95	236
25	162	86	78	66	72	68	108	66	64	77	136	199
26	130	94	76	68	68	70	103	62	73	75	122	184
27	123	95	75	70	66	73	100	68	68	68	173	162
28	126	88	73	70	66	75	96	65	69	69	125	139
29	123	85	73	70	66	81	96	66	69	89	100	128
30	115	78	73	70	---	86	95	77	70	79	92	119
31	113	---	73	72	---	96	---	142	---	69	88	---
TOTAL	3129	2895	2435	2192	2067	2133	4491	2398	2475	2276	2493	4350
MEAN	101	96.5	78.5	70.7	71.3	68.8	150	77.4	82.5	73.4	80.4	145
MAX	268	157	85	76	77	96	351	142	168	109	173	461
MIN	68	78	73	64	66	60	95	62	64	59	61	68

CAL YR 1979 TOTAL 40151 MEAN 110 MAX 804 MIN 45
WTR YR 1980 TOTAL 33334 MEAN 91.1 MAX 461 MIN 59

04061000 BRULE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'31", long 88°15'57", in SE¼ SE¼ sec.11, T.41 N., R.32 W., Michigan Meridian, Iron County, Hydrologic Unit 04030106, on left bank 40 ft (12 m) upstream from highway bridge, 1.0 mi (1.6 km) upstream from Paint River, 2.5 mi (4.0 km) north of Florence, and 5.0 mi (8.0 km) upstream from confluence with Michigamme River.

DRAINAGE AREA.--389 mi^2 (1,008 km^2).

PERIOD OF RECORD.--January 1914 to February 1916, June 1944 to current year.

REVISED RECORDS.--WSP 1387: 1914-16. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,200.55 ft (365.928 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to Aug. 29, 1944, nonrecording gage at bridge 40 ft (12 m) downstream at same datum.

REMARKS.--Records good except those for the winter period, which are fair. Discharge includes some mine pumpage prior to August, 1977. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years (water years 1915, 1945-80), 358 ft^3/s (10.14 m^3/s), 12.50 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,700 ft^3/s (133 m^3/s) July 2, 1953, gage height, 6.57 ft (2.003 m); maximum gage height, 8.27 ft (2.521 m) Dec. 26, 1969, backwater from ice; minimum discharge, 118 ft^3/s (3.34 m^3/s) Dec. 2, 1963 (discharge measurement); minimum gage height, 1.79 ft (0.546 m) July 24, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,430 ft^3/s (40.5 m^3/s) Sept. 23, gage height, 3.83 ft (1.167 m); maximum gage height, 7.53 ft (2.295 m) Nov. 11, backwater from ice; minimum discharge, 197 ft^3/s (5.58 m^3/s) July 10, gage height, 1.93 ft (0.588 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	289	564	280	275	265	265	370	378	470	256	274	523
2	308	597	270	270	265	260	380	369	417	243	254	471
3	313	527	310	270	265	260	390	352	365	246	240	414
4	316	469	360	265	270	260	406	342	322	228	246	511
5	315	442	410	265	270	255	436	339	300	238	277	461
6	306	471	380	260	275	255	548	329	325	235	255	384
7	302	459	360	260	275	255	726	323	355	234	288	339
8	298	431	340	265	275	255	913	319	467	223	348	312
9	308	407	330	270	275	255	1190	314	437	213	340	491
10	313	400	320	275	275	260	1140	313	373	206	303	438
11	316	390	310	280	275	260	897	370	328	219	292	377
12	314	385	300	285	275	265	732	370	298	252	270	343
13	312	380	300	290	275	270	650	392	289	297	260	422
14	307	375	295	300	275	275	572	327	290	333	252	609
15	302	370	295	310	270	280	528	309	286	391	253	581
16	298	360	290	315	265	290	495	298	268	316	240	495
17	295	355	285	320	265	300	478	286	255	285	234	439
18	292	350	280	320	270	310	512	285	256	266	234	406
19	304	348	280	320	275	320	557	278	286	303	237	382
20	352	351	280	320	280	320	584	278	289	426	294	374
21	375	369	275	310	280	320	573	280	273	548	331	866
22	693	376	275	310	280	320	555	266	260	542	303	1330
23	1120	379	275	305	285	320	530	260	247	450	268	1370
24	1050	375	275	300	285	325	491	255	237	351	279	1020
25	813	353	275	295	280	330	456	250	229	328	509	812
26	630	364	280	290	275	330	433	246	268	333	587	717
27	546	388	280	285	275	335	419	243	290	300	694	632
28	532	369	280	280	275	340	402	261	282	277	680	556
29	514	370	280	275	270	345	391	254	274	322	547	502
30	482	320	280	270	---	350	388	266	267	323	467	464
31	460	---	275	265	---	360	---	355	---	305	419	---
TOTAL	13375	12094	9325	8920	7940	9145	17142	9507	9303	9489	10475	17041
MEAN	431	403	301	288	274	295	571	307	310	306	338	568
MAX	1120	597	410	320	285	360	1190	392	470	548	694	1370
MIN	289	320	270	260	265	255	370	243	229	206	234	312
CFSM	1.11	1.04	.77	.74	.70	.76	1.47	.79	.80	.79	.87	1.46
IN.	1.28	1.16	.89	.85	.76	.87	1.64	.91	.89	.91	1.00	1.63

CAL YR 1979 TOTAL 159925 MEAN 438 MAX 2450 MIN 205 CFSM 1.13 IN 15.29
WTR YR 1980 TOTAL 133756 MEAN 365 MAX 1370 MIN 206 CFSM .94 IN 12.79

04061500 PAINT RIVER AT CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'21", long 88°20'05", in SE¼ sec.20, T.43 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 150 ft (46 m) downstream from municipal powerplant at Crystal Falls, and 14.5 mi (23.3 km) upstream from mouth.

DRAINAGE AREA.--597 mi² (1,546 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1174: 1947-48(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 1,306.1 ft (398.10 m), Wisconsin Electric Power Co. datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant immediately upstream; since storage capacity is small, daily flows are not affected appreciably. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 591 ft³/s (16.74 m³/s), 13.44 in/yr (341 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,900 ft³/s (309 m³/s) Apr. 25, 1960, gage height, 9.82 ft (2.993 m); minimum, 7.7 ft³/s (0.22 m³/s) Sept. 17, 1950, gage height, 0.89 ft (0.271 m); minimum daily, 81 ft³/s (2.29 m³/s) Nov. 1, 1947.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,240 ft³/s (91.8 m³/s) Sept. 22, gage height, 5.26 ft (1.603 m); minimum, 192 ft³/s (5.44 m³/s) Aug. 4, gage height, 2.01 ft (0.613 m); minimum daily, 265 ft³/s (7.50 m³/s) May 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	295	1330	434	367	370	288	563	736	2070	377	397	527
2	306	1510	401	367	370	293	623	691	2010	353	366	522
3	318	1390	409	353	373	281	675	641	1790	325	348	501
4	326	1230	475	335	371	294	688	585	1460	295	325	585
5	343	1110	531	319	369	293	696	546	1130	304	350	575
6	325	1050	501	345	372	293	915	517	958	323	334	501
7	313	975	460	340	379	282	1360	501	883	317	363	456
8	313	875	427	338	364	287	2010	502	1070	299	382	412
9	334	773	415	347	346	285	2540	491	1020	279	380	895
10	352	697	451	341	352	287	2430	485	866	267	348	1320
11	356	583	469	384	344	293	2030	518	736	280	333	974
12	356	575	423	369	345	281	1770	524	630	302	335	729
13	356	560	393	375	341	279	1540	491	527	306	336	718
14	374	550	403	383	346	290	1320	482	519	372	337	1350
15	388	540	397	394	331	286	1150	453	535	640	353	1510
16	402	531	407	409	343	292	1050	431	517	586	342	1290
17	384	570	364	430	335	289	970	410	499	535	310	1120
18	388	556	362	437	334	317	1020	388	474	512	314	971
19	402	554	394	439	336	318	1230	376	454	580	312	872
20	492	586	399	420	335	339	1460	359	427	679	361	823
21	562	608	404	408	333	348	1550	349	389	835	394	1990
22	902	626	407	401	332	339	1610	326	365	800	380	3150
23	2100	622	405	403	335	328	1590	302	340	662	349	2640
24	2240	615	405	383	337	328	1470	299	321	568	384	2080
25	2540	585	403	386	340	327	1320	281	303	527	735	1820
26	1650	592	394	382	316	340	1160	271	365	678	926	1840
27	1460	606	384	384	312	356	1050	271	552	662	962	1700
28	1380	589	363	377	308	372	918	265	433	613	799	1450
29	1340	507	362	372	309	396	838	273	404	535	670	1210
30	1230	448	362	368	---	443	780	348	397	487	570	1040
31	1130	---	358	366	---	492	---	1090	---	428	530	---
TOTAL	23657	22343	12762	11722	9978	9936	38326	14202	22444	14726	13625	35571
MEAN	763	745	412	378	344	321	1278	458	748	475	440	1186
MAX	2540	1510	531	439	379	492	2540	1090	2070	835	962	3150
MIN	295	448	358	319	308	279	563	265	303	267	310	412
CFSM	1.28	1.25	.69	.63	.58	.54	2.14	.77	1.25	.80	.74	1.99
IN.	1.47	1.39	.80	.73	.62	.62	2.39	.88	1.40	.92	.85	2.22

CAL YR 1979 TOTAL 291379 MEAN 798 MAX 5910 MIN 261 CFSM 1.34 IN 18.16
WTR YR 1980 TOTAL 229292 MEAN 626 MAX 3150 MIN 265 CFSM 1.05 IN 14.29

04062000 PAINT RIVER NEAR ALPHA, MI

LOCATION.--Lat 46°00'40", long 88°15'30", in NW¼ NW¼ sec.25, T.42 N., R.32 W., Iron County, Hydrologic Unit 04030106, on right bank 0.6 mi (1.0 km) downstream from Lower Paint Dam, 5.5 mi (8.8 km) upstream from Brule River, and 6.0 mi (9.7 km) southeast of Alpha.

DRAINAGE AREA.--631 mi² (1,634 km²).

PERIOD OF RECORD.--June 1952 to current year. Monthly discharge only for period October 1953 to September 1960, published in WSP 1727.

REVISED RECORDS.--WSP 1727: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,260 ft (384 m) from topographic map (nearest 10 ft).

REMARKS.--Records good. Flow completely regulated by powerplant and Lower Paint Dam, 0.6 mi (1.0 km) upstream. Records not adjusted for diversion to Michigamme River by Paint River diversion canal. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 171 ft³/s (4.843 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,050 ft³/s (228 m³/s) July 2, 1953, gage height, 10.50 ft (3.200 m); minimum daily, 62 ft³/s (1.76 m³/s) Mar. 22, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,010 ft³/s (56.9 m³/s) Sept. 22, gage height, 6.16 ft (1.878 m); minimum daily, 80 ft³/s (2.27 m³/s) Apr. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	620	90	90	87	87	91	88	91	90	90	97
2	92	660	90	90	87	87	90	88	485	90	90	105
3	92	640	90	90	87	87	89	88	1040	90	91	96
4	93	530	90	90	87	87	89	87	345	91	92	95
5	92	500	90	90	87	87	90	86	91	93	92	95
6	94	580	90	90	87	87	91	86	90	92	92	95
7	92	200	90	90	87	87	93	86	91	92	93	95
8	92	90	90	90	87	87	92	86	90	92	93	95
9	92	90	90	90	87	87	172	86	101	93	92	101
10	92	90	90	90	87	87	227	87	92	92	93	95
11	92	90	90	90	87	87	105	88	92	92	93	93
12	91	90	90	90	87	87	87	87	92	92	93	93
13	92	90	90	90	87	87	80	87	92	92	95	97
14	92	90	90	90	87	87	82	88	92	93	95	96
15	94	90	90	90	87	87	89	88	90	92	94	96
16	92	90	90	88	87	87	88	88	91	92	97	95
17	92	90	90	88	87	87	88	88	92	92	97	93
18	92	90	90	88	87	87	88	88	92	93	97	93
19	92	90	90	88	87	87	88	88	92	90	97	93
20	92	90	90	88	87	87	88	88	92	93	97	93
21	92	90	90	88	87	87	88	88	92	92	97	656
22	97	90	90	88	87	87	88	88	92	92	97	1420
23	640	90	90	88	87	87	86	88	92	92	97	1930
24	1150	90	90	88	87	87	86	88	92	92	98	1830
25	1120	90	90	88	87	87	88	87	92	92	97	936
26	858	90	90	88	87	87	89	88	93	92	95	96
27	634	90	90	88	87	88	88	88	92	92	94	95
28	627	90	90	87	87	94	88	88	92	91	97	94
29	377	90	90	87	87	92	88	88	92	89	96	94
30	92	90	90	87	---	90	88	88	92	89	116	93
31	92	---	90	87	---	90	---	88	---	90	96	---
TOTAL	7627	6000	2790	2754	2523	2716	2884	2713	4354	2839	2953	9155
MEAN	246	200	90.0	88.8	87.0	87.6	96.1	87.5	145	91.6	95.3	305
MAX	1150	660	90	90	87	94	227	88	1040	93	116	1930
MIN	91	90	90	87	87	87	80	86	90	89	90	93

CAL YR 1979 TOTAL 115989 MEAN 318 MAX 4500 MIN 88
WTR YR 1980 TOTAL 49308 MEAN 135 MAX 1930 MIN 80

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI

LOCATION.--Lat 46°28'00", long 88°04'28", in SW¼ SW¼ sec.16, T.47 N., R.30 W., Marquette County, Hydrologic Unit 04030107, on right bank 20 ft (6 m) upstream from Northern Natural Gas Co. pipeline, 0.6 mi (1.0 km) upstream from Spruce River, 1.2 mi (1.9 km) downstream from Lake Michigamme, and 5.0 mi (8.0 km) southeast of Michigamme.

DRAINAGE AREA.--194 mi² (502 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1968 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,520 ft (462 m) from topographic map (nearest ft).

REMARKS.--Water-discharge records good.

AVERAGE DISCHARGE.--12 years, 286 ft³/s (8.100 m³/s), 20.02 in/yr (509 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,180 ft³/s (90.1 m³/s) Apr. 19, 1976, gage height, 7.77 ft (2.368 m); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 30, 1976, gage height, 1.56 ft (0.475 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 24, gage height, 6.11 ft (1.862 m); minimum, 74 ft³/s (2.10 m³/s) Mar. 16, gage height, 2.88 ft (0.878 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	115	807	272	139	127	86	85	1010	214	152	147	87
2	113	909	266	137	124	85	90	937	285	146	137	88
3	108	979	259	134	121	83	96	867	353	137	129	89
4	106	978	254	131	118	83	104	791	395	130	121	89
5	101	936	250	128	116	83	114	713	402	135	121	87
6	99	872	246	127	114	82	133	632	398	125	114	88
7	96	793	245	135	112	81	170	569	426	146	110	88
8	94	727	241	132	109	80	224	512	458	160	105	86
9	93	658	236	130	107	79	277	470	460	160	102	90
10	92	595	233	127	105	79	330	435	430	159	97	88
11	91	527	228	129	104	78	390	421	395	153	96	87
12	92	480	222	129	103	77	443	398	362	144	95	90
13	97	440	218	130	100	77	476	381	338	137	91	106
14	97	407	211	132	99	77	486	360	343	146	91	173
15	98	386	206	131	97	76	483	338	348	159	93	229
16	100	356	202	135	97	76	462	318	343	164	91	272
17	107	339	195	144	95	76	448	301	336	167	88	296
18	114	324	189	147	94	76	453	288	323	165	86	319
19	132	309	184	146	93	76	510	275	305	166	86	334
20	153	304	180	146	92	76	638	262	289	182	86	352
21	187	304	175	145	91	76	814	249	274	193	85	412
22	243	305	172	145	91	76	1010	236	261	204	84	495
23	352	300	168	146	90	76	1220	224	247	202	82	565
24	571	296	165	145	89	76	1380	209	234	196	84	604
25	746	291	162	142	88	77	1410	194	219	209	87	634
26	806	293	158	141	88	77	1350	178	208	203	91	660
27	815	291	155	140	88	77	1240	166	190	194	92	698
28	806	285	152	138	88	79	1210	155	173	185	89	720
29	788	283	149	135	87	79	1150	145	169	178	89	709
30	769	274	145	132	---	81	1080	150	161	167	88	683
31	757	---	141	129	---	83	---	175	---	158	88	---
TOTAL	8938	15048	6279	4227	2927	2443	18316	12359	9339	5122	3045	9318
MEAN	288	502	203	136	101	78.8	611	399	311	165	98.2	311
MAX	815	979	272	147	127	86	1410	1010	460	209	147	720
MIN	91	274	141	127	87	76	85	145	161	125	82	86
CFSM	1.49	2.59	1.05	.70	.52	.41	3.15	2.06	1.60	.85	.51	1.60
IN.	1.71	2.89	1.20	.81	.56	.47	3.51	2.37	1.79	.98	.58	1.79

CAL YR 1979 TOTAL 138303 MEAN 379 MAX 3020 MIN 91 CFSM 1.95 IN 26.52
WTR YR 1980 TOTAL 97361 MEAN 266 MAX 1410 MIN 76 CFSM 1.37 IN 18.67

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1970 to November 1980 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV									
06...	1045	870	45	6.8	6.0	80	1.0	17	4.4
28...	1345	283	42	6.7	2.5	80	1.0	17	4.4
DEC									
19...	0900	187	49	6.5	1.5	75	1.0	16	4.3
JAN									
31...	1100	130	46	6.6	.5	60	.50	19	4.9
FEB									
28...	1000	87	41	6.4	.0	50	4.5	18	4.6
MAR									
25...	1200	76	47	7.0	1.5	70	.50	17	4.6
MAY									
01...	1030	1010	35	6.5	6.0	60	.60	16	4.2
29...	0845	148	40	6.6	16.0	50	.60	17	4.2
JUN									
19...	0945	308	41	6.8	16.0	50	.50	16	4.0
AUG									
06...	0840	118	38	6.5	19.0	50	.50	--	--
28...	1100	89	42	6.8	19.0	50	.50	17	4.0
SEP									
24...	1155	605	38	6.6	12.0	50	.25	18	4.6

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV								
06...	1.4	.14	410	--	240	--	20	5
28...	1.4	.29	370	--	240	20	10	10
DEC								
19...	1.3	.15	310	70	240	10	7	3
JAN								
31...	1.6	.12	440	140	300	20	10	10
FEB								
28...	1.5	.48	400	140	260	--	20	5
MAR								
25...	1.4	.19	360	110	250	10	3	7
MAY								
01...	1.3	.16	360	90	270	30	0	30
29...	1.5	.11	300	150	150	30	20	7
JUN								
19...	1.4	.13	250	120	130	--	20	4
AUG								
06...	--	.12	240	--	--	20	--	--
28...	1.6	.12	160	30	130	40	30	10
SEP								
24...	1.6	.14	300	150	150	30	30	0

04062230 MICHIGAMME RIVER NEAR MICHIGAMME, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV									
06...	1000	298	38	6.6	4.5	60	.90	17	4.4

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV								
06...	1.5	.12	350	170	180	--	20	4

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI

LOCATION.--Lat 46°14'48", long 88°00'45", in NW¼ NW¼ sec.1, T.44 N., R.30 W., Dickinson County, Hydrologic Unit 04030107, on left bank 20 ft (6 m) upstream from bridge on county highway, 0.4 mi (0.6 km) upstream from Witch Lake Outlet, and 2.0 mi (3.2 km) south of Witch Lake.

DRAINAGE AREA.--316 mi^2 (818 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1964 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 1,384.25 ft (421.919 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation caused by dam 14 mi (23 km) upstream. Some flow diverted and returned above station by iron ore processing plant.

AVERAGE DISCHARGE.--16 years, 428 ft^3/s (12.12 m^3/s), 18.39 in/yr (467 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,360 ft^3/s (123 m^3/s) May 11, 1965, gage height, 11.60 ft (3.536 m); minimum, 23 ft^3/s (0.65 m^3/s) Nov. 15, 28, 1976; minimum gage height, 1.96 ft (0.597 m) Sept. 10, 11, 12, 13, Nov. 15, 1976.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,800 ft^3/s (51.0 m^3/s) Apr. 26, gage height, 7.05 ft (2.149 m); minimum, 126 ft^3/s (3.57 m^3/s) Oct. 12, gage height, 2.63 ft (0.802 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	183	1150	460	170	210	150	251	1370	403	257	225	167
2	184	1200	440	170	205	150	278	1300	451	215	210	169
3	183	1240	435	170	200	145	292	1220	521	179	204	170
4	175	1330	425	170	200	145	303	1130	574	159	186	183
5	176	1290	422	170	195	140	321	1030	606	143	185	192
6	162	1250	411	170	190	140	354	954	609	136	175	182
7	144	1180	403	175	185	140	416	884	619	222	177	176
8	144	1090	389	180	180	140	531	803	751	337	202	155
9	199	1000	397	185	180	140	740	733	896	351	194	165
10	215	907	370	190	175	135	849	670	788	260	171	162
11	175	828	362	200	175	135	795	647	674	191	155	152
12	129	716	350	205	170	135	757	619	601	184	147	149
13	149	642	366	210	170	135	768	583	525	210	157	205
14	200	600	300	215	165	130	775	538	548	238	162	347
15	243	550	326	225	160	130	788	524	585	255	161	522
16	195	530	316	230	160	130	766	505	572	281	146	515
17	158	516	300	235	155	135	730	452	550	302	144	473
18	167	493	280	240	155	140	698	446	511	316	145	490
19	208	510	265	245	160	150	851	427	470	282	156	567
20	235	524	250	245	190	160	924	370	455	274	171	573
21	272	515	240	245	230	170	1080	356	416	307	172	718
22	469	484	230	245	210	176	1250	330	378	392	158	910
23	874	486	220	240	190	194	1400	301	355	374	139	964
24	1090	489	210	240	170	197	1590	251	333	266	155	934
25	1080	486	200	235	160	182	1760	241	282	310	184	952
26	1150	497	190	230	155	170	1790	245	290	362	187	1010
27	1200	500	185	230	150	169	1710	246	281	347	230	1040
28	1180	494	180	225	150	165	1610	221	281	310	244	1030
29	1160	486	175	220	150	206	1530	168	281	294	183	1030
30	1140	476	175	220	---	211	1450	191	274	281	158	1020
31	1100	---	170	215	---	230	---	328	---	238	157	---
TOTAL	14339	22459	9442	6545	5145	4877	27357	18083	14880	8273	5440	15322
MEAN	463	749	305	211	177	157	912	583	496	267	175	511
MAX	1200	1330	460	245	230	230	1790	1370	896	392	244	1040
MIN	129	476	170	170	150	130	251	168	274	136	139	149
CFSM	1.47	2.37	.97	.67	.56	.50	2.89	1.85	1.57	.85	.55	1.62
IN.	1.69	2.64	1.11	.77	.61	.57	3.22	2.13	1.75	.97	.64	1.80

CAL YR 1979 TOTAL 207506 MEAN 569 MAX 4130 MIN 129 CFSM 1.80 IN 24.43
WTR YR 1980 TOTAL 152162 MEAN 416 MAX 1790 MIN 129 CFSM 1.32 IN 17.91

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1965 to November 1980 (discontinued).

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV									
06...	1245	1220	56	7.0	5.0	70	2.0	22	5.5
28...	1130	492	75	7.0	1.5	70	1.0	33	8.0
DEC									
19...	1030	260	90	6.8	.5	70	1.0	34	8.4
JAN									
31...	1345	214	90	6.9	.0	70	1.0	40	9.5
FEB									
28...	1145	149	102	7.1	.0	60	.60	46	11
MAR									
25...	1005	172	120	7.4	2.0	40	1.2	50	12
MAY									
01...	1245	1370	51	6.8	10.0	65	.80	20	5.0
29...	1230	154	87	7.4	18.5	45	.80	39	9.4
JUN									
19...	1215	468	60	7.1	16.0	50	.50	26	6.3
AUG									
06...	1115	169	92	7.2	19.0	50	1.1	42	10
28...	1315	245	94	7.4	18.0	50	1.2	45	11
SEP									
24...	1030	940	69	6.8	10.0	70	.50	26	6.2

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV								
06...	1.9	.17	480	--	270	40	20	20
28...	3.1	.37	500	--	320	50	10	40
DEC								
19...	3.1	.20	500	120	380	50	0	50
JAN								
31...	4.0	.19	600	220	380	50	10	40
FEB								
28...	4.6	.22	570	220	350	60	10	50
MAR								
25...	4.9	.33	560	230	330	70	20	50
MAY								
01...	1.8	.16	470	210	260	40	20	20
29...	3.8	.11	360	150	210	70	20	50
JUN								
19...	2.5	15	390	180	210	60	30	30
AUG								
06...	4.1	.17	440	130	310	50	10	40
28...	4.3	.26	400	190	210	50	20	30
SEP								
24...	2.6	.25	770	530	240	130	110	20

04062400 MICHIGAMME RIVER NEAR WITCH LAKE, MI--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1980 TO SEPTEMBER 1981

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
NOV									
06...	1200	376	63	6.9	3.5	50	.50	28	6.8

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)
NOV								
06...	2.6	.18	500	230	270	40	10	30

04062500 MICHIGAMME RIVER NEAR CRYSTAL FALLS, MI

LOCATION.--Lat 46°06'50", long 88°12'57", in NW¼ sec.20, T.43 N., R.31 W., Iron County, Hydrologic Unit 04030107, on right bank 400 ft (122 m) upstream from highway bridge, 5.0 mi (8.0 km) downstream from Michigamme Reservoir, 6.0 mi (9.7 km) east of Crystal Falls and 15 mi (24 km) upstream from confluence with Brule River.

DRAINAGE AREA.--656 mi² (1,699 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,300 ft (396 m) from topographic map (nearest 10 ft).

REMARKS.--Records excellent. Flow regulated by powerplant and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), 5 mi (8 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 699 ft³/s (19.80 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,260 ft³/s (206 m³/s) Apr. 28, 1960, gage height, 10.73 ft (3.271 m); minimum daily, 71 ft³/s (2.01 m³/s) Nov. 26, 1950.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,120 ft³/s (60.0 m³/s) Oct. 28, gage height, 6.22 ft (1.896 m); minimum, 99 ft³/s (2.80 m³/s) Feb. 29, gage height, 1.44 ft (0.439 m); minimum daily, 130 ft³/s (3.68 m³/s) Apr. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	423	1740	1120	1140	1150	221	374	610	155	558	669	577
2	557	1740	1120	1140	1130	197	547	563	157	556	668	574
3	554	1730	1120	1140	1130	431	544	563	155	439	667	575
4	556	1730	1120	1140	1120	655	550	563	409	178	671	574
5	443	1720	1130	1140	1120	667	562	562	629	172	670	570
6	150	1720	1130	1140	1110	754	579	561	676	168	667	566
7	152	1560	1130	1100	1100	562	618	561	682	409	677	563
8	497	1120	1150	1100	450	166	434	561	680	559	507	565
9	560	1350	1150	1140	550	172	234	561	944	560	180	596
10	558	1590	1150	1140	558	484	155	562	1160	560	165	612
11	558	1330	1150	1100	446	642	144	568	1160	334	413	581
12	444	1130	1150	1130	1060	826	132	565	1160	170	554	576
13	163	1120	1150	1100	1070	687	136	564	1160	167	554	588
14	168	1120	1150	1090	1060	337	130	562	1050	435	553	592
15	430	1120	1150	1080	418	159	131	563	673	628	550	579
16	555	1120	1150	1080	530	152	147	562	674	606	550	576
17	561	1120	1150	837	530	348	150	561	961	562	550	555
18	556	1120	1150	957	541	455	154	561	1180	634	550	570
19	280	1040	1160	1070	739	437	162	561	1180	672	550	573
20	152	643	1150	1070	730	436	163	559	893	688	550	642
21	157	645	1160	1070	722	275	145	557	672	691	550	816
22	202	647	1160	1120	706	149	156	557	608	690	390	1040
23	783	639	1170	1160	671	152	166	447	559	672	170	1220
24	1140	590	1160	1150	670	150	159	171	559	672	165	1200
25	1120	589	1150	1150	672	155	157	161	559	674	160	934
26	1110	653	1150	1150	663	156	155	157	557	669	150	734
27	1240	950	1150	1150	642	160	155	399	435	670	150	997
28	1580	1120	1160	1150	635	157	402	552	190	671	150	1190
29	1730	1130	1150	1150	506	160	619	554	177	668	150	1180
30	1720	1120	1150	1150	---	163	666	444	419	670	167	1400
31	1720	---	1150	1150	---	168	---	163	---	671	432	---
TOTAL	20735	35086	35600	34314	23939	10684	8861	15455	20474	16473	13549	22315
MEAN	669	1170	1148	1107	825	345	295	499	682	531	437	744
MAX	1730	1740	1170	1150	1150	826	666	610	1140	691	677	1400
MIN	150	589	1120	837	506	149	130	157	155	167	150	555

CAL YR 1979 TOTAL 352501 MEAN 966 MAX 3130 MIN 148
WTR YR 1980 TOTAL 257455 MEAN 703 MAX 1740 MIN 130

04063000 MENOMINEE RIVER NEAR FLORENCE, WI

LOCATION.--Lat 45°57'04", long 88°11'13", in NE¼ sec.16, T.41 N., R.31 W., Michigan Meridian, Iron County, Hydrologic Unit 04030108, on left bank 0.5 mi (0.8 km) downstream from confluence of Brule and Michigamme Rivers, 3.5 mi (5.6 km) northeast of Florence, and at mile 117 (188 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²).

PERIOD OF RECORD.--January 1914 to current year. Published as "at Twin Falls near Iron Mountain, MI" 1914-57. Records published for both sites July 1950 to September 1957.

REVISED RECORDS.--WSP 1707: 1953 (M). WSP 1911: Drainage area of former site.

GAGE.--Water-stage recorder. Datum of gage is 1,119.23 ft (341.141 m) National Geodetic Vertical Datum of 1929 (levels by Owen Ayres Associates). Prior to July 1950, headwater and tailwater gages and generation data entered hourly in daily log sheets by company employees at the Twin Falls Powerplant of Wisconsin Electric Power Co., 10.4 mi (16.7 km) downstream.

REMARKS.--Records excellent. Prior to July 1950, discharge determined from powerplant records computed on basis of load-discharge rating of hydroelectric units and rating for tailwater gage during periods of spill. Rating developed by Geological Survey. Flow regulated by powerplants, Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on Michigamme River, and by many smaller reservoirs above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--66 years, 1,798 ft³/s (50.92 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,500 ft³/s (552 m³/s) Apr. 26, 1960, gage height, 14.15 ft (4.313 m); minimum, 38 ft³/s (1.08 m³/s) Aug. 21, 1962, Sept. 26, 1975; minimum gage height, 1.18 ft (0.360 m) Aug. 21, 1962, Nov. 4, 1965; minimum daily discharge, 57 ft³/s (1.61 m³/s) Sept. 26, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,840 ft³/s (165 m³/s) Sept. 23, 24, gage height, 7.38 ft (2.249 m); minimum, 226 ft³/s (6.40 m³/s) Jan. 4, gage height, 1.94 ft (0.591 m); minimum daily, 561 ft³/s (15.9 m³/s) May 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1210	4160	2000	1790	2040	1140	745	1810	1800	1260	1700	1450
2	1370	4320	1900	1850	1980	1160	1530	1780	2640	1300	1440	1750
3	1330	4250	1890	1790	2060	1560	1570	1750	3800	1290	1490	1790
4	1280	3900	1840	1940	2030	1560	1530	1730	3370	652	1490	1640
5	1220	3240	1760	1860	1880	1700	1640	1820	2530	759	1180	1960
6	723	3240	2250	1780	1970	1790	1550	1940	2180	657	1440	1790
7	840	3190	1830	1810	1900	1670	1540	1920	1170	1210	1290	1340
8	1330	2690	2180	1980	1440	927	1520	1820	1590	1450	1630	1660
9	1230	2860	2130	1850	1320	1090	2850	1930	2450	1130	772	2210
10	1250	2830	1830	1870	1230	1460	3360	1600	2420	1070	847	2600
11	1370	2610	1980	1930	1510	1530	2740	1690	2650	1080	1350	2710
12	1200	2670	2350	1910	1910	1490	2270	1540	2400	689	1150	2350
13	681	2340	2240	1750	1890	1400	2210	1310	2360	766	1340	2530
14	771	2060	2340	1710	1850	1470	2140	1730	2130	1430	1560	2850
15	1560	2080	2260	1770	1790	1340	1700	1410	1790	1660	1570	3210
16	1590	2190	2180	1930	1470	1270	1740	1270	1610	1810	1300	2710
17	1080	2240	2440	2130	1400	1560	1660	1280	1720	1990	1140	2290
18	1450	2010	1740	2040	1600	1340	1690	1140	1770	1980	1180	1990
19	1320	2230	2010	2020	1970	1730	1840	1320	1770	1830	1250	1530
20	927	1550	1940	1770	1910	1500	2270	1490	1800	1810	1200	1290
21	846	1880	1940	1950	1870	1480	2170	1270	1220	2200	1230	3220
22	2020	1940	1850	2010	1880	999	2440	1340	1390	2320	1590	5230
23	4120	1970	1670	2050	1880	852	2810	1330	1480	2510	863	5740
24	4800	2140	1760	2060	1600	1010	1850	1020	1350	2290	986	5420
25	4650	2180	1720	1930	1900	974	1970	561	1290	1950	1490	4660
26	4170	2000	1800	1830	1700	966	1800	773	1600	1880	1030	3340
27	3540	2450	1920	1820	1810	1020	1770	1300	1420	1790	2220	3100
28	3560	2310	2010	1890	1660	805	1830	1100	974	1830	2260	3150
29	3450	2350	2180	1970	1740	936	1750	1110	759	1760	2450	3120
30	2950	2000	1900	2030	---	773	1810	1090	1640	1760	2130	3040
31	3010	---	1840	1950	---	792	---	1140	---	2040	1960	---
TOTAL	60848	77880	61850	58970	51190	39344	58315	44304	57053	48153	44528	81670
MEAN	1963	2596	1995	1902	1765	1269	1944	1429	1902	1553	1436	2722
MAX	4800	4320	2440	2130	2060	1790	3360	1940	3800	2510	2450	5740
MIN	681	1550	1670	1710	1230	773	745	561	759	652	772	1290

CAL YR 1979 TOTAL 879752 MEAN 2410 MAX 8090 MIN 681
WTR YR 1980 TOTAL 684095 MEAN 1869 MAX 5740 MIN 561

04065300 WEST BRANCH STURGEON RIVER NEAR RANDVILLE, MI

LOCATION.--Lat 46°00'45", long 87°58'41", in NE¼ sec.30, T.42 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on right bank 500 ft (152 m) downstream from county highway bridge, 3.0 mi (4.8 km) downstream from Tom Kings Creek, and 4.0 mi (6.4 km) northeast of Randville.

DRAINAGE AREA.--56.1 mi^2 (145.3 km^2).

PERIOD OF RECORD.--August 1958 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Sharp-crested weir since Aug. 6, 1976. Altitude of gage is 1,170 ft (357 m) from topographic map (nearest 10 ft).

REMARKS.--Records good. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Small diversions for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 43.8 ft^3/s (1.240 m^3/s), 10.60 in/yr (269 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 570 ft^3/s (16.1 m^3/s) May 7, 1960, gage height, 6.40 ft (1.951 m); minimum, 1.5 ft^3/s (0.042 m^3/s) July 22, 1964, gage height, 1.35 ft (0.411 m); minimum daily, 3.4 ft^3/s (0.096 m^3/s) July 22, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 340 ft^3/s (9.63 m^3/s) Oct. 24, gage height, 5.51 ft (1.679 m); minimum, 7.5 ft^3/s (0.21 m^3/s) Aug. 4, gage height, 3.40 ft (1.036 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	98	45	21	15	14	72	56	27	10	9.4	66
2	33	114	45	21	15	13	80	50	35	9.8	8.4	73
3	21	94	35	19	15	12	90	45	31	8.9	8.0	57
4	20	72	30	18	15	12	75	41	23	8.1	7.7	59
5	21	62	28	17	15	12	80	38	20	12	21	46
6	19	72	28	16	15	12	102	36	30	11	34	32
7	18	70	27	15	14	12	129	33	31	10	29	23
8	18	63	27	14	15	12	191	33	32	14	33	19
9	24	49	27	12	15	12	265	35	27	16	27	78
10	32	43	27	14	14	12	279	32	23	11	18	106
11	29	35	27	21	14	12	206	36	18	10	18	80
12	26	35	26	21	15	12	151	36	15	10	17	47
13	25	31	25	19	15	12	112	31	14	9.9	14	65
14	24	31	24	19	14	12	88	28	19	10	14	101
15	24	32	23	21	14	11	74	26	18	15	12	102
16	25	30	23	36	14	12	68	24	15	12	11	78
17	23	34	23	50	14	13	66	23	13	12	10	57
18	20	33	21	53	13	13	74	22	17	12	10	50
19	22	34	21	47	14	14	86	21	17	13	10	52
20	25	38	20	35	14	19	90	19	17	31	13	56
21	41	43	21	34	14	20	94	18	14	45	15	139
22	106	51	21	34	15	19	94	17	12	31	12	306
23	259	56	23	28	15	19	86	15	11	25	10	277
24	329	57	28	27	15	18	78	14	10	16	13	156
25	246	51	27	26	14	17	68	13	9.4	14	39	108
26	136	53	26	23	15	19	62	12	9.0	14	63	99
27	98	69	22	21	15	23	58	12	8.8	12	81	89
28	96	66	21	18	15	23	54	13	10	11	84	70
29	76	52	21	17	14	30	54	12	11	15	62	53
30	66	50	21	16	---	39	56	14	11	11	43	47
31	60	---	21	15	---	57	---	28	---	10	34	---
TOTAL	1980	1618	804	748	421	537	3082	833	548.2	449.7	780.5	2591
MEAN	63.9	53.9	25.9	24.1	14.5	17.3	103	26.9	18.3	14.5	25.2	86.4
MAX	329	114	45	53	15	57	279	56	35	45	84	306
MIN	18	30	20	12	13	11	54	12	8.8	8.1	7.7	19
+	5.5	5.6	5.9	5.9	5.9	5.7	5.2	5.3	5.6	5.4	5.7	5.0
MEAN‡	69.4	59.5	31.8	30.0	20.4	23.0	108	32.2	23.9	19.9	30.9	91.4
CFSM‡	1.24	1.06	.57	.53	.36	.41	1.93	.57	.43	.35	.55	1.63
IN‡	1.43	1.18	.65	.62	.39	.47	2.15	.66	.47	.41	.63	1.82

CAL YR 1979 TOTAL 21682.0 MEAN 59.4 MAX 439 MIN 15 MEAN‡ 64.3 CFSM‡ 1.15 IN‡ 15.56
WTR YR 1980 TOTAL 14392.4 MEAN 39.3 MAX 329 MIN 7.7 MEAN‡ 44.9 CFSM‡ .80 IN‡ 10.90

+ Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.
‡ Adjusted for diversion.

04065393 EAST BRANCH STURGEON RIVER BELOW SKUNK CREEK, NEAR FELCH, MI

LOCATION.--Lat 46°01'34", long 87°49'56", in NW¼ NE¼ sec.20, T.42 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on right bank 50 ft (15 m) downstream from Skunk Creek, and 2.2 mi (3.5 km) north of Felch.

DRAINAGE AREA.--61.8 mi² (160.1 km²).

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972, 1973. October 1973 to current year.

GAGE.--Water-stage recorder. Datum of gage is 1,069.53 ft (325.993 m) National Geodetic Vertical Datum of 1929. Sept. 9, 1972 to Dec. 20, 1973, nonrecording gage at same site and datum.

REMARKS.--Records fair. No gage-height record Aug. 15 to Sept. 24. Since June 1975, occasional regulation during low flows by Gene Lake Reservoir (usable capacity, 3,990 acre-ft or 4.92 hm³) 3 mi (5 km) upstream. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--7 years, 55.3 ft³/s (1.566 m³/s), 12.15 in/yr (309 mm/yr), adjusted for initial storage.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 628 ft³/s (17.8 m³/s) Apr. 26, 1979, gage height, 4.28 ft (1.305 m); minimum, 3.4 ft³/s (0.096 m³/s) Sept. 7, 8, 9, 13, 1976, July 7, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 381 ft³/s (10.8 m³/s) Apr. 10, gage height, 3.77 ft (1.149 m); minimum, 3.4 ft³/s (0.096 m³/s) July 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17	100	70	36	26	22	63	88	31	6.2	5.2	35
2	20	105	56	34	25	22	77	82	36	5.8	4.7	37
3	19	100	48	32	24	21	82	76	35	4.8	4.2	40
4	19	96	43	32	24	21	79	72	29	4.6	4.2	48
5	19	92	40	27	24	20	90	68	27	5.6	14	45
6	18	90	39	28	23	19	112	62	45	8.0	8.8	43
7	17	88	39	28	23	19	163	58	140	4.0	12	40
8	17	84	39	28	23	18	225	52	176	14	14	36
9	23	75	38	29	23	18	333	48	183	7.9	12	39
10	25	64	37	29	22	18	381	44	180	5.8	9.7	45
11	25	56	36	30	22	18	360	45	175	5.2	10	54
12	25	51	36	31	22	18	295	43	100	4.6	11	52
13	26	45	36	31	22	18	233	40	70	4.7	10	50
14	25	43	36	31	22	18	194	39	58	6.2	10	60
15	25	42	35	32	22	19	159	37	50	10	10	62
16	26	40	35	38	21	19	129	35	40	7.7	10	64
17	26	40	35	48	21	20	111	33	15	7.2	10	62
18	26	40	35	54	21	20	113	33	12	6.5	10	58
19	26	41	36	57	21	20	122	31	13	9.0	10	58
20	26	43	36	55	21	20	129	29	13	17	10	60
21	39	48	37	54	21	20	133	27	11	23	10	90
22	84	67	39	50	21	20	135	25	10	17	10	140
23	130	80	42	47	21	20	138	23	9.1	14	10	180
24	160	84	47	44	21	19	130	23	8.0	11	12	220
25	190	77	50	41	21	18	110	21	6.6	10	20	199
26	200	80	49	38	22	19	100	19	6.0	9.4	30	185
27	170	108	47	34	22	21	96	18	5.4	7.4	40	160
28	150	106	45	31	22	22	105	16	7.2	6.5	48	127
29	130	91	42	29	22	25	100	15	7.7	8.1	44	98
30	110	82	40	28	---	31	94	16	6.8	6.7	40	79
31	96	---	38	26	---	46	---	31	---	5.9	35	---
TOTAL	1909	2158	1281	1132	645	649	4591	1249	1505.8	263.8	488.8	2466
MEAN	61.6	71.9	41.3	36.5	22.2	20.9	153	40.3	50.2	8.51	15.8	82.2
MAX	200	108	70	57	26	46	381	88	183	23	48	220
MIN	17	40	35	26	21	18	63	15	5.4	4.0	4.2	35
CFSM	1.00	1.16	.67	.59	.36	.34	2.48	.65	.81	.14	.26	1.33
IN.	1.15	1.30	.77	.68	.39	.39	2.76	.75	.91	.16	.29	1.48

CAL YR 1979 TOTAL 30035.0 MEAN 82.3 MAX 608 MIN 15 CFSM 1.33 IN 18.08
WTR YR 1980 TOTAL 18338.4 MEAN 50.1 MAX 381 MIN 4.0 CFSM .81 IN 11.04

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI

LOCATION.--Lat 45°57'55", long 87°41'53", in SW¼ NW¼ sec.9, T.41 N., R.27 W., Dickinson County, Hydrologic Unit 04030108, on right bank 10 ft (3 m) downstream from bridge on county highway, at Hardwood, 350 ft (107 m) upstream from Schultz Creek, and 9 mi (14 km) upstream from confluence with West Branch.

DRAINAGE AREA.--90.8 mi^2 (235.2 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1972-77. October 1977 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,030 ft (314 m) from topographic map (nearest 10 ft). Sept. 20, 1972 to Sept. 30, 1977, non-recording gage at site 1 mi (2 km) upstream at different datum. Oct. 1-20, 1977, non-recording gage at present site and datum.

REMARKS.--Water-discharge records good. Occasional regulation during low flows by Gene Lake Reservoir in headwaters (station 04065393) and Hardwood Reservoir 1.2 mi (1.9 km) upstream, combined usable capacity, 11,180 acre-ft (13.8 hm^3).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 869 ft^3/s (24.6 m^3/s) Apr. 27, 1979, gage height, 8.44 ft (2.573 m); minimum, 3.4 ft^3/s (0.096 m^3/s) Aug. 14, 1980, gage height, 2.67 ft (0.814 m), result of unusual regulation at Hardwood Reservoir, minimum daily, 4.0 ft^3/s (0.11 m^3/s) Oct. 31, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 388 ft^3/s (11.0 m^3/s) Apr. 11, gage height, 6.41 ft (1.954 m); minimum, 3.4 ft^3/s (0.096 m^3/s) Aug. 14, gage height, 2.67 ft (0.814 m), result of unusual regulation at Hardwood Reservoir.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	29	171	108	45	37	27	46	127	41	22	22	49
2	30	157	98	44	35	27	46	124	50	22	22	54
3	30	152	88	41	34	28	52	118	53	23	22	62
4	31	149	78	38	33	35	67	113	51	23	23	69
5	29	145	74	36	32	40	87	105	51	23	23	68
6	29	147	70	38	32	41	106	98	54	23	24	64
7	27	139	69	42	31	40	135	94	61	23	25	57
8	28	136	63	38	31	40	190	90	76	23	25	51
9	34	127	58	35	31	39	281	87	93	24	24	57
10	36	113	59	35	31	39	353	81	109	24	24	55
11	39	98	60	40	31	39	384	80	116	23	24	54
12	40	92	58	38	30	39	373	76	121	24	23	53
13	40	85	54	39	29	39	330	74	109	23	23	74
14	40	78	54	38	29	40	278	65	83	23	20	89
15	40	74	51	41	29	40	236	66	63	24	22	92
16	40	70	50	55	28	40	196	64	52	24	22	94
17	40	69	47	62	28	41	170	59	38	24	22	89
18	39	69	45	63	27	41	154	58	34	22	22	86
19	38	68	52	66	28	43	157	54	32	22	22	84
20	38	69	53	69	28	45	145	53	25	23	22	86
21	44	74	50	70	28	45	148	50	9.3	24	22	133
22	73	85	50	71	28	44	152	50	11	23	22	167
23	135	94	58	69	29	43	153	44	11	23	22	199
24	180	101	63	63	29	43	153	28	16	22	22	247
25	228	106	64	58	29	42	151	28	28	23	24	277
26	267	118	62	54	29	42	146	28	25	22	25	268
27	277	127	58	50	28	42	143	28	24	22	26	229
28	256	130	54	46	27	43	136	27	25	22	25	209
29	224	131	53	44	27	44	137	26	24	22	30	183
30	196	122	50	41	---	44	144	28	23	22	40	159
31	173	---	47	39	---	46	---	35	---	22	43	---
TOTAL	2750	3296	1898	1508	868	1241	5249	2058	1508.3	709	757	3458
MEAN	88.7	110	61.2	48.6	29.9	40.0	175	66.4	50.3	22.9	24.4	115
MAX	277	171	108	71	37	46	384	127	121	24	43	277
MIN	27	68	45	35	27	27	46	26	9.3	22	20	49
CFSM	.98	1.21	.67	.54	.33	.44	1.93	.73	.55	.25	.27	1.27
IN.	1.13	1.35	.78	.62	.36	.51	2.15	.84	.62	.29	.31	1.42

CAL YR 1979 TOTAL 44021.0 MEAN 121 MAX 859 MIN 27 CFSM 1.33 IN 18.03
WTR YR 1980 TOTAL 25300.3 MEAN 69.1 MAX 384 MIN 9.3 CFSM .76 IN 10.37

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: December 1977 to current year.

INSTRUMENTATION.--Water-quality monitor since December 1977.

REMARKS.--Intermittent ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum recorded, 28.0°C July 11, 12, 1979; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 26.5°C June 23, Aug. 12, 22; minimum, 0.0°C on several days during February and March.

TEMPERATURE, WATER (DFG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	15.0	14.0	14.5	6.0	2.0	4.5	2.5	2.0	2.5	3.0	2.5	2.5
2	15.0	13.5	14.0	6.0	5.5	5.5	2.5	2.0	2.0	3.0	2.5	2.5
3	13.5	12.5	13.5	5.5	5.0	5.5	2.5	1.5	2.0	3.0	2.0	2.5
4	14.0	12.0	12.5	5.5	4.5	5.0	2.5	1.5	2.0	3.0	1.5	2.5
5	13.0	11.5	12.0	5.0	4.0	4.5	2.0	1.5	1.5	3.0	2.0	2.0
6	12.5	11.5	12.0	4.0	4.0	4.0	2.5	1.5	2.0	2.5	1.5	2.0
7	13.0	10.5	11.5	4.5	4.0	4.0	1.5	1.0	1.5	2.0	1.5	2.0
8	11.0	10.0	10.5	4.0	3.0	4.0	1.5	1.0	1.5	2.0	1.0	1.5
9	11.0	9.0	10.0	3.5	3.0	3.0	2.0	1.5	1.5	1.5	1.0	1.5
10	11.0	9.0	9.5	4.0	3.0	3.0	1.5	1.0	1.5	2.5	1.5	2.0
11	10.0	8.5	9.5	4.0	3.0	3.5	1.5	1.0	1.0	2.5	.5	2.0
12	9.0	8.0	8.5	4.0	3.0	3.0	2.0	1.0	1.5	2.0	.5	1.5
13	9.0	8.0	8.0	4.0	3.0	3.5	2.0	1.0	1.5	2.0	2.0	2.0
14	8.5	7.5	8.0	4.0	3.0	3.5	1.5	1.0	1.5	3.0	2.0	2.0
15	10.0	7.5	8.5	3.5	3.0	3.0	2.0	1.5	1.5	2.5	1.5	2.0
16	10.0	8.0	9.0	4.0	2.5	3.0	1.5	1.0	1.0	1.5	.5	1.5
17	11.0	8.5	9.5	3.0	2.0	2.5	1.0	1.0	1.0	1.5	1.0	1.0
18	10.0	8.0	8.5	4.0	2.0	2.5	1.5	1.0	1.5	2.0	1.5	1.5
19	8.0	6.0	7.5	3.0	.5	2.0	3.0	1.5	2.0	2.0	1.5	2.0
20	8.0	6.5	7.5	2.5	.5	1.5	3.0	2.0	2.5	2.0	1.5	2.0
21	11.0	6.0	8.5	3.0	2.0	2.5	2.5	2.0	2.5	2.5	1.5	2.0
22	10.5	8.5	9.5	2.5	1.5	2.0	2.5	2.0	2.0	2.0	1.5	2.0
23	8.5	7.5	8.0	1.5	1.5	1.5	2.0	1.5	1.5	2.0	1.0	1.5
24	7.5	7.5	7.5	2.5	1.5	2.0	1.5	1.5	1.5	2.0	1.0	1.5
25	7.5	6.5	7.0	3.0	1.5	2.5	2.5	1.5	2.0	2.0	1.5	1.5
26	7.0	6.0	6.5	1.5	.5	1.0	3.0	2.0	2.5	2.0	1.5	2.0
27	6.5	5.5	6.0	2.5	1.0	2.0	3.0	2.0	2.5	2.0	1.5	1.5
28	6.0	5.5	6.0	3.0	2.5	3.0	3.0	2.0	2.5	2.0	1.5	1.5
29	6.0	5.5	6.0	3.0	2.5	2.5	3.5	2.0	2.5	2.0	1.0	1.5
30	5.5	4.5	5.0	3.0	2.5	2.5	3.5	2.0	2.5	2.0	.5	1.5
31	5.0	2.5	4.0	---	---	---	3.5	2.5	3.0	2.0	1.0	1.5
MONTH	15.0	2.5	9.0	6.0	.5	3.0	3.5	1.0	2.0	3.0	.5	2.0

04065397 EAST BRANCH STURGEON RIVER AT HARDWOOD, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	2.5	.5	1.5	2.5	.0	.5	5.0	1.5	2.5	14.0	10.0	11.5
2	2.5	.5	1.5	3.0	.0	1.0	6.0	1.5	3.0	13.5	10.5	12.0
3	2.0	.5	1.5	3.0	.5	1.5	3.0	1.5	2.5	14.5	11.0	12.5
4	3.0	1.5	2.0	2.5	1.0	1.5	5.0	2.0	3.0	13.0	11.5	12.0
5	2.5	1.0	1.5	3.0	.5	1.5	5.0	2.0	3.0	13.0	11.0	12.0
6	3.0	1.0	1.5	1.5	.0	1.0	3.5	2.5	3.0	11.5	9.0	10.5
7	2.5	1.0	2.0	3.5	.0	1.0	3.0	2.0	2.5	10.0	9.0	9.5
8	3.5	1.5	2.0	3.5	.0	1.0	2.0	2.0	2.0	10.0	8.5	9.0
9	3.5	1.5	2.0	3.0	.5	1.5	2.0	2.0	2.0	10.5	8.5	9.5
10	2.5	1.0	2.0	2.5	.0	1.0	2.0	2.0	2.0	10.0	9.0	9.5
11	3.0	1.5	2.0	2.5	.0	.5	2.5	2.0	2.0	11.0	8.5	9.5
12	3.0	1.0	2.0	2.0	.0	.5	2.0	2.0	2.0	11.5	8.5	10.0
13	3.0	1.5	2.0	2.0	.5	1.0	2.0	2.0	2.0	11.5	10.0	10.5
14	3.0	.5	1.5	3.5	.5	1.0	2.0	2.0	2.0	11.0	10.0	10.5
15	3.0	1.5	2.0	3.0	.0	1.0	2.0	1.5	2.0	12.5	9.5	10.5
16	2.5	1.0	1.5	2.0	.5	1.0	3.0	2.0	2.5	13.5	9.5	11.0
17	3.0	.5	1.5	2.5	.0	1.0	3.5	2.0	2.5	13.0	10.0	11.5
18	3.5	1.0	2.0	3.5	.0	1.0	4.5	2.5	3.5	14.0	11.0	12.0
19	3.0	2.0	2.5	3.5	.5	1.5	4.5	3.0	3.5	14.5	10.5	12.0
20	3.0	2.0	2.5	2.5	.5	1.0	5.0	3.5	4.0	14.0	10.5	12.0
21	3.0	2.0	2.0	3.5	.5	1.0	6.0	4.0	4.5	15.0	10.5	12.0
22	4.0	2.0	2.5	3.5	.5	1.5	6.5	4.5	5.5	15.0	10.5	12.0
23	3.0	2.0	2.0	1.0	.5	1.0	5.0	4.0	4.5	15.0	11.0	12.5
24	3.0	1.0	2.0	2.5	1.0	1.5	4.5	4.0	4.5	15.0	10.5	12.5
25	2.5	.5	1.0	4.0	1.0	1.5	6.0	4.5	5.0	16.0	10.5	12.5
26	1.5	.0	1.0	4.0	1.0	2.0	8.0	6.0	7.0	16.0	9.5	12.0
27	3.0	.5	1.5	2.0	1.0	1.5	10.0	7.0	8.5	12.5	10.0	11.5
28	2.5	.0	1.0	4.0	1.0	2.0	9.5	9.0	9.0	16.5	10.0	12.5
29	1.5	.0	.5	4.0	1.0	2.0	10.0	9.0	9.5	15.0	10.5	12.0
30	---	---	---	5.0	1.0	2.5	12.0	9.0	10.5	13.0	11.0	11.5
31	---	---	---	5.5	1.5	2.5	---	---	---	15.0	12.0	13.0
MONTH	4.0	.0	1.5	5.5	.0	1.5	12.0	1.5	4.0	16.5	8.5	11.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	13.5	12.0	12.5	19.0	14.5	15.5	24.5	18.0	20.5	21.5	20.0	20.5
2	15.0	12.5	14.0	21.0	13.0	16.0	23.5	19.0	20.5	22.5	20.0	21.0
3	16.5	13.5	15.0	22.0	13.5	16.5	24.0	17.5	20.5	21.0	17.5	20.0
4	18.0	13.5	15.5	20.5	14.5	16.5	20.0	18.5	19.0	23.5	17.5	20.0
5	15.0	13.5	14.5	17.5	15.0	16.0	23.5	17.0	19.5	23.0	20.5	21.5
6	16.0	13.5	14.5	21.0	13.5	16.5	25.0	18.0	20.5	23.5	20.5	21.5
7	16.0	15.0	15.5	21.0	15.0	17.0	26.0	18.5	21.0	22.5	20.0	21.0
8	15.5	14.0	14.5	21.0	14.5	17.0	25.0	21.0	22.5	21.0	20.0	20.5
9	16.5	14.5	15.0	22.5	15.5	17.5	25.5	20.5	22.5	23.0	19.5	21.0
10	16.0	14.5	15.0	23.0	15.5	18.0	25.0	21.5	23.0	23.0	20.0	21.0
11	18.0	14.5	16.0	22.5	15.5	18.0	23.5	20.5	22.0	23.0	20.0	21.0
12	16.5	15.0	15.5	21.5	15.5	17.5	26.5	20.5	22.5	21.0	19.5	20.0
13	17.5	15.0	16.0	20.5	15.5	17.5	22.0	21.0	21.5	19.0	17.5	18.5
14	18.5	16.5	17.0	17.5	16.0	17.0	25.5	20.5	22.0	19.0	17.5	19.0
15	19.0	15.5	17.0	23.5	15.5	18.5	25.0	20.5	22.0	19.0	17.5	18.0
16	20.0	15.0	16.5	20.5	16.5	18.0	25.0	20.0	22.0	18.5	17.0	17.5
17	19.0	14.0	16.0	22.5	16.0	18.5	21.5	20.5	21.0	19.0	17.0	17.5
18	16.5	14.5	15.5	17.5	16.5	17.0	26.0	20.5	22.5	17.5	16.5	16.5
19	19.0	14.0	16.0	24.0	15.5	18.5	21.5	19.5	20.5	16.0	14.0	15.5
20	20.0	13.5	16.5	18.0	17.0	17.0	20.0	19.5	20.0	16.0	12.5	14.5
21	21.5	15.0	18.0	21.5	16.0	18.0	26.0	19.0	21.5	15.5	14.0	14.5
22	24.5	15.5	19.5	20.5	16.0	19.0	26.5	20.0	22.5	15.5	13.0	14.5
23	26.5	18.5	22.0	23.5	16.0	19.0	26.0	20.0	22.0	16.0	15.0	15.5
24	26.0	16.5	20.5	24.0	17.0	19.5	21.5	20.0	20.5	15.0	13.5	14.5
25	21.0	15.0	17.0	20.0	18.0	18.5	23.0	19.5	20.5	13.5	12.5	13.5
26	20.5	14.5	17.0	23.5	17.0	19.0	22.0	19.5	20.0	13.0	12.5	13.0
27	15.0	13.5	14.0	24.5	16.5	19.5	23.5	19.5	21.0	13.0	11.5	12.5
28	18.0	13.5	15.0	24.0	17.5	19.5	20.0	19.5	20.0	13.0	12.0	12.5
29	16.0	13.5	14.5	24.0	17.5	20.0	20.0	19.0	19.5	12.5	11.0	11.5
30	19.0	13.5	15.5	22.0	17.5	19.5	22.0	19.0	20.5	12.5	12.0	12.5
31	---	---	---	23.0	18.0	20.0	23.5	20.5	21.5	---	---	---
MONTH	26.5	12.0	16.0	24.5	13.0	18.0	26.5	17.0	21.0	23.5	11.0	17.5

04065500 STURGEON RIVER NEAR FOSTER CITY, MI

LOCATION.--Lat 45°54'30", long 87°45'15", in NW¼ sec.36, T.41 N., R.28 W., Dickinson County, Hydrologic Unit 04030108, on left bank 30 ft (9 m) downstream from bridge on County Highway 569, 1.8 mi (2.9 km) downstream from confluence of East and West Branches, and 4.0 mi (6.4 km) south of Foster City.

DRAINAGE AREA.--237 mi² (614 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1954 to September 1980 (discontinued).

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 966.6 ft (294.620 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Since December 1958, diversion above station for industrial use; figures of runoff adjusted thereafter. Since June 1975, occasional regulation during low flows by reservoirs in headwaters of East Branch (stations 04065393 and 04065397). Small diversions for sprinkler irrigation.

AVERAGE DISCHARGE.--26 years, 188 ft³/s (5.324 m³/s), 10.77 in/yr (274 mm/yr), adjusted for industrial diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,570 ft³/s (72.8 m³/s) May 8, 1960, gage height, 10.35 ft (3.155 m); minimum, 15 ft³/s (0.42 m³/s) July 24, 1964; minimum gage height, 1.96 ft (0.597 m) Aug. 21, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,020 ft³/s (28.9 m³/s) Apr. 11, gage height, 7.06 ft (2.151 m); minimum, 44 ft³/s (1.25 m³/s) June 25, Aug. 3, 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	69	362	245	105	80	66	190	281	136	56	54	139
2	73	388	225	100	78	64	223	271	149	53	49	173
3	84	389	205	94	76	64	240	258	155	50	46	188
4	91	374	185	90	74	62	249	243	146	48	45	193
5	83	336	166	86	72	62	261	232	128	58	68	178
6	80	329	153	88	70	62	299	217	137	60	69	165
7	76	326	150	92	70	62	365	202	149	61	92	139
8	75	311	145	90	68	62	475	188	160	58	103	118
9	85	285	140	82	68	62	752	184	171	54	92	150
10	97	246	135	84	68	62	959	179	179	57	84	193
11	103	204	135	90	66	62	1010	176	182	55	80	212
12	109	197	130	90	66	64	942	169	184	50	83	203
13	104	184	125	90	64	64	806	164	177	51	77	216
14	101	170	120	90	64	64	646	155	154	53	71	252
15	99	162	120	96	62	64	511	148	134	56	63	273
16	98	152	115	120	62	66	426	137	109	58	60	275
17	95	155	110	140	62	68	372	132	92	61	57	250
18	93	152	100	150	62	72	343	125	83	60	55	217
19	91	157	115	160	62	76	339	124	83	67	56	207
20	90	158	120	155	62	82	350	112	87	81	61	206
21	103	167	115	145	62	86	359	106	71	102	61	320
22	174	202	115	135	64	90	367	99	56	112	61	545
23	369	234	130	125	64	92	370	95	50	102	57	616
24	550	248	140	120	64	94	361	89	46	86	56	658
25	664	247	145	115	64	96	344	76	51	74	80	670
26	715	254	140	105	66	100	325	66	54	66	117	610
27	660	297	130	100	66	110	307	63	52	62	177	511
28	565	314	125	96	66	120	292	62	58	58	191	430
29	474	289	120	92	66	130	282	61	59	60	182	371
30	409	259	115	88	---	150	285	67	59	61	169	314
31	362	---	110	84	---	170	---	106	---	59	145	---
TOTAL	6841	7548	4324	3297	1938	2548	13050	4587	3351	1989	2661	8992
MEAN	221	252	139	106	66.8	82.2	435	148	112	64.2	85.8	300
MAX	715	389	245	160	80	170	1010	281	184	112	191	670
MIN	69	152	100	82	62	62	190	61	46	48	45	118
*	5.5	5.6	5.9	5.9	5.9	5.7	5.2	5.3	5.6	5.4	5.7	5.0
MEAN‡	226	258	145	112	72.7	87.9	440	153	118	69.6	91.5	305
CFSM‡	.95	1.09	.61	.47	.31	.37	1.86	.65	.50	.29	.39	1.29
IN‡	1.10	1.21	.71	.55	.33	.43	2.07	.75	.55	.34	.45	1.43

CAL YR 1979 TOTAL 107843 MEAN 295 MAX 1890 MIN 69 MEAN‡ 300 CFSM‡ 1.27 IN‡ 17.21
WTR YR 1980 TOTAL 61126 MEAN 167 MAX 1010 MIN 45 MEAN‡ 173 CFSM‡ .73 IN‡ 9.92

* Average monthly diversion, equivalent in cubic feet per second, for industrial use; furnished by Hanna Mining Co.

‡ Adjusted for diverison.

04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: July 1956 to September 1980 (discontinued).

INSTRUMENTATION.--Temperature recorder since July 26, 1956.

REMARKS.--Temperature recorder clock stopped Oct. 4 to Nov. 7 (range in temperature 3.0 to 11.5°C), Nov. 7-9 (range in temperature 2.0 to 3.0°C), Nov. 9 to Dec. 18 (range in temperature 0.0 to 2.5°C) and June 18. Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 30.0°C July 1, 1963, July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 27.5°C July 10; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.0	13.0			---	---	.0	.0	.0	.0	.0	.0
2	13.0	12.0			---	---	.0	.0	.0	.0	.0	.0
3	12.5	11.5			---	---	.0	.0	.0	.0	.0	.0
4	---	---			---	---	.0	.0	.0	.0	.0	.0
5	---	---			---	---	.0	.0	.0	.0	.0	.0
6	---	---			---	---	.0	.0	.0	.0	.0	.0
7	---	---			---	---	.0	.0	.0	.0	.0	.0
8	---	---			---	---	.0	.0	.0	.0	.0	.0
9	---	---			---	---	.0	.0	.0	.0	.0	.0
10	---	---			---	---	.0	.0	.0	.0	.0	.0
11	---	---			---	---	.0	.0	.0	.0	.0	.0
12	---	---			---	---	.0	.0	.0	.0	.0	.0
13	---	---			---	---	.0	.0	.0	.0	.0	.0
14	---	---			---	---	.0	.0	.0	.0	.0	.0
15	---	---			---	---	.0	.0	.0	.0	.0	.0
16	---	---			---	---	.0	.0	.0	.0	.0	.0
17	---	---			---	---	.0	.0	.0	.0	.0	.0
18	---	---			---	---	.0	.0	.0	.0	.0	.0
19	---	---			.0	.0	.0	.0	.0	.0	.0	.0
20	---	---			.0	.0	.0	.0	.0	.0	.0	.0
21	---	---			.0	.0	.0	.0	.0	.0	.0	.0
22	---	---			.0	.0	.0	.0	.0	.0	.0	.0
23	---	---			.0	.0	.0	.0	.0	.0	.0	.0
24	---	---			.0	.0	.0	.0	.0	.0	.0	.0
25	---	---			.0	.0	.0	.0	.0	.0	.0	.0
26	---	---			.0	.0	.0	.0	.0	.0	.0	.0
27	---	---			.0	.0	.0	.0	.0	.0	.0	.0
28	---	---			.0	.0	.0	.0	.0	.0	.0	.0
29	---	---			.0	.0	.0	.0	.0	.0	.0	.0
30	---	---			.0	.0	.0	.0	---	---	.0	.0
31	---	---			.0	.0	.0	.0	---	---	1.0	.0
MONTH							.0	.0	.0	.0	1.0	.0

04065500 STURGEON RIVER NEAR FOSTER CITY, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	1.5	.5	13.5	10.0	18.0	14.5	22.0	19.0	24.5	20.5	19.0	18.5
2	2.0	.5	14.5	11.5	16.0	14.0	22.5	18.0	24.0	21.5	19.0	18.0
3	1.0	.5	15.0	12.0	18.0	14.5	24.0	19.0	24.5	20.5	19.0	17.0
4	2.0	.5	16.0	12.5	19.0	15.5	24.0	20.5	23.5	21.0	19.0	17.0
5	3.0	.5	15.5	13.5	18.0	15.5	23.0	20.5	23.0	19.5	18.5	17.0
6	2.5	2.0	14.0	11.5	19.0	15.0	22.5	18.0	25.0	20.0	19.0	16.5
7	2.0	2.0	11.5	10.0	19.5	16.5	25.0	19.5	25.0	22.0	20.0	17.0
8	2.0	1.5	10.0	9.0	16.5	14.5	25.5	21.5	25.0	23.5	21.5	18.5
9	1.5	1.0	10.0	8.5	17.0	14.5	26.5	22.5	24.0	21.5	21.0	19.0
10	1.0	1.0	10.0	9.5	16.0	14.5	27.5	23.0	23.5	21.5	19.0	16.5
11	1.5	1.0	11.0	9.5	18.5	14.5	27.0	24.0	22.5	20.5	18.0	16.0
12	1.5	1.5	13.0	10.5	19.0	17.0	26.0	22.0	22.0	19.0	18.0	16.5
13	1.5	1.0	13.0	11.5	20.5	18.5	25.0	22.0	22.0	20.0	16.5	16.0
14	1.5	1.0	11.5	10.5	21.0	19.0	24.5	22.5	22.0	19.0	16.5	15.5
15	2.5	1.0	14.0	9.5	20.0	17.0	26.5	23.0	21.5	18.5	15.5	14.5
16	3.0	1.5	15.0	11.0	20.5	16.5	26.5	24.0	20.5	17.0	15.0	15.0
17	5.0	3.0	15.0	13.5	21.0	17.0	25.5	22.5	19.5	18.0	15.0	13.5
18	6.5	4.5	17.5	14.0	---	---	25.5	22.0	22.0	18.0	14.5	13.5
19	6.5	5.5	18.5	14.5	19.0	15.0	25.0	20.0	21.5	19.5	14.0	12.5
20	8.0	5.5	19.0	16.0	20.0	15.5	24.5	21.5	21.0	20.0	14.0	13.0
21	9.0	7.0	20.0	16.0	20.0	17.5	23.0	20.0	23.5	20.5	14.0	13.0
22	10.0	7.5	22.0	17.5	22.5	17.5	22.5	20.5	23.0	19.5	13.5	13.0
23	10.0	7.0	22.5	18.5	24.5	20.0	23.0	19.0	23.0	19.5	13.0	12.0
24	7.0	5.0	23.0	19.0	25.5	21.0	23.5	20.0	22.5	20.0	12.5	11.5
25	6.0	4.5	22.0	19.0	27.0	22.5	23.5	22.0	21.0	19.0	11.5	11.0
26	7.5	6.0	21.5	17.5	26.5	23.5	22.5	19.5	21.0	20.0	11.0	10.0
27	10.0	7.0	20.0	17.5	25.0	19.0	23.5	18.5	20.0	18.5	11.0	10.0
28	10.0	8.5	21.0	16.0	20.5	17.5	23.0	20.0	19.0	17.5	10.5	9.5
29	9.5	9.0	21.0	17.5	20.0	18.5	24.0	20.5	18.5	17.5	12.0	10.5
30	12.0	9.0	20.0	18.5	20.5	17.0	23.5	20.5	19.5	18.5	12.0	12.0
31	---	---	19.5	17.0	---	---	23.5	20.0	19.5	18.0	---	---
MONTH	12.0	.5	23.0	8.5			27.5	18.0	25.0	17.0	21.5	9.5

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI

LOCATION.--Lat 45°55'51", long 87°58'18", in SE¼ SE¼ sec.19, T.41 N., R.29 W., Dickinson County, Hydrologic Unit 04030108, on left bank 20 ft (6 m) upstream from culvert on County Road 866, 1.2 mi (1.9 km) downstream from Steel Creek, and 9.0 mi (14.5 km) northeast of Iron Mountain.

DRAINAGE AREA.--16.8 mi² (43.5 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water year 1971. October 1971 to current year.

GAGE.--Water-stage recorder. V-notch sharp-crested weir since Sept. 7, 1979. Datum of gage is 1,034 ft (315.16 m) National Geodetic Vertical Datum of 1929, from topographic leveling (nearest 0.5 ft). Mar. 22 to Nov. 23, 1971, nonrecording gage 20 ft (6 m) downstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Flow includes an average of 5.6 ft³/s (0.16 m³/s) diverted from West Branch Sturgeon River basin. Regulation and storage by reservoirs in the headwaters.

AVERAGE DISCHARGE.--5 years (water years 1972-76), 14.5 ft³/s (0.411 m³/s), 11.72 in/yr (298 mm/yr), adjusted for storage and diversion.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 272 ft³/s (7.70 m³/s) May 16, 1976, gage height, 6.42 ft (1.957 m); maximum gage height, 8.8 ft (2.68 m) Mar. 27, 1979, from floodmark in gage house, backwater from ice; minimum discharge, 0.70 ft³/s (0.020 m³/s) Aug. 11, 12, 1975; minimum gage height, 1.46 ft (0.445 m) Aug. 11, 12, 1975, and July 27, 28, Aug. 15, 1977, result of unusual regulation upstream.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 119 ft³/s (3.37 m³/s) Sept. 21, 22, gage height, 5.30 ft (1.615 m); maximum gage height, 5.63 ft (1.716 m) Jan. 23, backwater from ice; minimum daily discharge, 3.5 ft³/s (0.099 m³/s) July 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.4	54	21	14	12	5.4	17	17	10	4.5	4.8	31
2	6.4	45	21	12	11	5.3	19	16	11	4.0	4.1	21
3	6.0	37	19	11	11	5.2	20	15	9.3	3.5	3.7	24
4	5.8	28	16	11	11	5.2	21	15	7.8	3.7	4.0	33
5	5.6	25	16	10	11	5.2	23	16	8.6	7.7	7.5	26
6	5.5	29	16	10	10	5.2	34	17	12	5.7	5.3	24
7	5.4	25	16	9.8	9.8	5.2	48	18	11	4.6	8.5	23
8	5.6	23	16	9.8	8.9	5.4	62	16	9.5	4.1	8.0	17
9	6.0	22	16	9.8	8.3	5.5	73	14	10	4.1	6.5	56
10	6.1	22	17	9.8	8.0	5.6	65	14	8.1	4.3	5.9	53
11	6.4	22	16	19	7.2	5.7	53	17	7.1	4.8	7.8	37
12	6.8	23	16	18	6.8	5.8	44	19	5.9	5.3	7.4	31
13	6.7	23	16	17	6.4	5.9	37	20	5.9	6.6	5.8	41
14	6.0	22	16	16	6.4	6.0	32	19	6.8	8.3	5.8	49
15	5.5	21	16	17	6.4	6.4	30	19	6.8	9.8	5.2	42
16	5.4	21	15	18	6.4	6.8	28	19	6.4	9.8	5.0	36
17	5.4	22	15	22	6.4	7.4	26	20	6.1	11	5.0	31
18	5.4	23	14	30	6.4	8.4	26	20	5.8	11	5.2	32
19	6.2	23	14	34	6.4	9.2	30	20	6.5	14	5.1	36
20	7.2	23	14	35	6.4	9.6	33	21	6.8	19	6.7	35
21	12	24	14	34	6.4	9.5	33	22	6.0	18	6.2	94
22	33	29	15	33	6.4	9.4	32	20	4.8	15	5.1	113
23	65	32	16	31	6.4	9.2	26	20	3.8	12	4.5	89
24	65	29	17	27	6.2	9.2	23	16	3.7	4.9	6.8	74
25	53	26	16	24	6.0	9.2	21	11	3.7	6.3	13	70
26	46	32	16	21	5.8	9.4	21	8.0	3.9	5.9	18	66
27	41	42	16	18	5.7	9.8	19	6.8	4.3	4.8	18	55
28	37	38	16	16	5.6	10	17	6.8	7.3	4.5	13	43
29	28	31	16	15	5.5	11	16	6.5	5.9	4.8	10	41
30	26	25	16	13	---	13	17	8.4	4.8	4.7	9.1	37
31	28	---	16	12	---	15	---	14	---	4.6	8.6	---
TOTAL	552.8	841	500	577.2	220.2	239.1	946	491.5	209.6	231.3	229.6	1356
MEAN	17.8	28.0	16.1	18.6	7.59	7.71	31.5	15.9	6.99	7.46	7.41	45.2
MAX	65	54	21	35	12	15	73	22	12	19	18	113
MIN	5.4	21	14	9.8	5.5	5.2	16	6.5	3.7	3.5	3.7	17

CAL YR 1979 TOTAL 8615.0 MEAN 23.6 MAX 145 MIN 5.4
WTR YR 1980 TOTAL 6394.3 MEAN 17.5 MAX 113 MIN 3.5

04065600 PINE CREEK NEAR IRON MOUNTAIN--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water year 1972 to current year.

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1971 to current year.

INSTRUMENTATION.--Temperature recorder since Nov. 10, 1971.

REMARKS.--Temperature recorder clock stopped Oct. 14-31 (range in temperature 6.0 to 9.5°C), July 25 to Aug. 28 (range in temperature 15.0 to 22.0°C). Complete ice cover during winter period.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 19, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 24.0°C July 15, 16; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
OCT							
31...	1000	27	560	7.7	6.0	11.5	96
NOV							
28...	1400	32	520	7.5	1.0	12.6	92
JAN							
02...	1330	13	433	8.0	.0	13.6	96
23...	1215	31	655	7.6	.0	13.3	94
FEB							
26...	1115	5.8	581	7.3	.0	12.2	86
MAR							
20...	1500	9.6	480	7.6	.0	12.2	86
MAY							
08...	1030	20	480	8.3	11.0	10.0	94
27...	1030	6.3	615	7.8	16.0	8.7	91
JUN							
20...	1430	7.1	512	8.0	14.5	9.8	98
JUL							
23...	1400	14	661	8.2	19.0	8.4	93
AUG							
28...	1630	11	438	7.9	15.5	8.9	92
SEP							
23...	1015	88	423	7.6	10.5	9.3	86

04065600 PINE CREEK NEAR IRON MOUNTAIN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	13.5	13.5	6.0	6.0	.5	.5	.0	.0	.0	.0	.0	.0
2	13.5	13.5	6.0	5.5	.5	.5	.0	.0	.0	.0	.0	.0
3	13.5	12.5	5.5	5.5	.5	.5	.0	.0	.0	.0	.0	.0
4	12.5	11.5	5.0	5.0	.5	.5	.0	.0	.0	.0	.0	.0
5	11.5	10.5	5.0	4.5	.5	.5	.0	.0	.0	.0	.0	.0
6	10.5	10.0	4.5	4.5	.5	.5	.0	.0	.0	.0	.0	.0
7	10.0	9.0	4.5	4.0	.5	.0	.0	.0	.0	.0	.0	.0
8	9.0	8.5	4.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0
9	8.5	8.0	4.0	4.0	.0	.0	.0	.0	.0	.0	.0	.0
10	8.0	7.5	4.0	3.5	.0	.0	.0	.0	.0	.0	.0	.0
11	7.5	7.0	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
12	7.0	7.0	3.5	3.5	.0	.0	.0	.0	.0	.0	.0	.0
13	7.0	6.5	3.5	3.0	.0	.0	.0	.0	.0	.0	.0	.0
14	---	---	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
15	---	---	3.0	3.0	.0	.0	.0	.0	.0	.0	.0	.0
16	---	---	3.0	2.5	.0	.0	.0	.0	.0	.0	.0	.0
17	---	---	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0
18	---	---	2.5	2.5	.0	.0	.0	.0	.0	.0	.0	.0
19	---	---	2.5	2.0	.0	.0	.0	.0	.0	.0	.0	.0
20	---	---	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
21	---	---	2.0	2.0	.0	.0	.0	.0	.0	.0	.0	.0
22	---	---	2.0	1.5	.0	.0	.0	.0	.0	.0	.0	.0
23	---	---	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
24	---	---	1.5	1.5	.0	.0	.0	.0	.0	.0	.0	.0
25	---	---	1.5	1.0	.0	.0	.0	.0	.0	.0	.0	.0
26	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
27	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
28	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
29	---	---	1.0	1.0	.0	.0	.0	.0	.0	.0	.0	.0
30	---	---	1.0	.5	.0	.0	.0	.0	---	---	.0	.0
31	---	---	---	---	.0	.0	.0	.0	---	---	.0	.0
MONTH			6.0	.5	.5	.0	.0	.0	.0	.0	.0	.0

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	.0	.0	11.0	8.0	17.0	14.0	19.0	18.0	---	---	17.0	17.0
2	.0	.0	11.5	9.0	16.0	14.0	19.0	16.0	---	---	17.0	16.5
3	.0	.0	13.0	9.5	18.0	14.0	20.0	16.0	---	---	17.0	16.0
4	.0	.0	14.5	10.5	18.0	15.0	20.0	19.0	---	---	18.0	17.0
5	1.0	.0	14.5	12.0	18.0	15.0	20.0	18.5	---	---	18.0	17.0
6	1.0	.5	13.0	10.5	18.0	15.0	19.5	15.5	---	---	18.5	16.5
7	.5	.5	10.5	8.5	18.0	15.0	22.0	18.5	---	---	19.0	17.0
8	.5	.5	9.0	8.0	15.0	12.5	22.0	20.0	---	---	20.0	18.5
9	.5	.5	9.5	7.5	15.0	13.5	22.0	20.0	---	---	20.0	18.0
10	1.0	.5	9.5	8.0	15.0	12.0	23.0	20.0	---	---	18.0	16.0
11	1.5	1.0	10.5	9.0	17.0	11.5	23.0	21.0	---	---	18.0	16.0
12	1.5	1.5	12.0	8.5	18.0	15.0	22.5	19.5	---	---	18.0	17.5
13	1.5	1.0	11.5	10.0	19.0	17.0	22.0	19.5	---	---	17.5	17.5
14	1.0	1.0	11.0	10.0	19.0	17.5	22.0	21.0	---	---	17.5	16.5
15	2.5	1.0	13.0	9.0	17.5	15.0	24.0	22.0	---	---	16.5	16.0
16	3.5	1.0	14.0	10.5	17.0	13.0	24.0	23.0	---	---	16.0	16.0
17	5.5	3.0	14.0	12.0	18.0	15.0	23.5	21.5	---	---	16.0	14.0
18	6.5	4.0	16.0	13.5	18.0	16.5	23.5	21.0	---	---	14.5	14.5
19	6.5	5.5	17.5	15.0	17.0	14.0	23.5	20.0	---	---	14.5	14.0
20	7.0	5.0	18.5	14.5	18.0	14.0	23.5	21.5	---	---	14.0	14.0
21	9.0	6.5	19.0	15.5	18.0	16.0	22.0	21.0	---	---	14.0	13.5
22	9.5	7.0	20.5	16.5	19.5	16.0	22.0	21.0	---	---	12.5	12.5
23	9.5	6.0	21.0	18.0	21.0	18.5	21.0	19.0	---	---	12.5	10.5
24	6.0	4.0	21.5	18.5	21.5	19.0	21.0	18.0	---	---	11.0	10.5
25	6.0	4.0	22.0	18.5	22.5	20.0	---	---	---	---	11.5	11.5
26	7.0	6.0	20.5	15.0	22.5	21.0	---	---	---	---	11.5	10.0
27	9.0	6.5	18.5	15.0	22.0	17.0	---	---	---	---	10.0	9.5
28	9.0	7.5	20.0	17.0	19.0	16.5	---	---	---	---	10.0	9.5
29	8.0	8.0	20.0	17.0	19.0	17.5	---	---	18.0	16.0	11.5	10.0
30	10.0	8.0	19.5	19.0	19.5	16.0	---	---	18.5	18.0	11.5	11.5
31	---	---	19.0	17.0	---	---	---	---	18.5	16.5	---	---
MONTH	10.0	.0	22.0	7.5	22.5	11.5					20.0	9.5

04066000 MENOMINEE RIVER NEAR PEMBINE, WI

LOCATION.--Lat 45°35'56", long 87°46'32", in SW¼, sec.16, T.37 N., R.28 W., Michigan Meridian, Menominee County, MI Hydrologic Unit 04030108, on left bank 0.6 mi (1.0 km) upstream from Pemene Creek, 4.0 mi (6.4 km) west of Nathan, MI, 10.9 mi (17.5 km) southeast of Pembine, and at mile 65.8 (105.9 km).

DRAINAGE AREA.--3,110 mi² (8,050 km²), revised.

PERIOD OF RECORD.--October 1949 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1277: 1952.

GAGE.--Water-stage recorder. Altitude of gage is 770 ft (235 m), from river-profile map. Prior to Oct. 28, 1972, at site 0.5 mi (0.8 km) downstream at datum 15 ft (4.6 m) lower.

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated by powerplants and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³), on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--31 years, 2,975 ft³/s (84.25 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26,900 ft³/s (762 m³/s) May 8, 1960, gage height, 13.90 ft (4.237 m); minimum, 694 ft³/s (19.7 m³/s) Sept. 3, 1969, gage height, 1.66 ft (0.506 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,670 ft³/s (274 m³/s) Sept. 23, gage height, 12.26 ft (3.737 m); minimum daily, 1,050 ft³/s (29.7 m³/s) July 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1600	5480	2600	2200	2400	1700	2000	3470	2290	1870	2510	3170
2	2120	6410	2300	2300	2200	1600	2290	3340	2660	1980	2420	3800
3	1890	6240	2600	2300	2200	1600	2820	3240	4770	1940	1950	3630
4	1930	6000	2820	2300	2200	1700	3460	3180	4620	1830	1960	3600
5	1820	5410	2640	2200	2300	1800	3430	3150	3990	1440	2520	3880
6	1690	5290	3060	1900	2200	1800	3240	3200	3340	1050	2600	3550
7	1450	4720	3050	1800	2100	1900	3560	3320	3650	1050	2200	3130
8	1420	4730	2800	1900	2000	1700	4450	3010	2710	1660	2100	2880
9	1830	4290	3000	2100	1900	1600	6680	2740	2730	1650	2300	3920
10	2120	4760	2900	2400	1800	1600	8020	2870	3690	1640	2000	4160
11	1850	4050	2600	2200	1800	1700	7760	3000	3680	1440	1800	4260
12	2170	3740	2500	2100	1900	1700	5910	2830	3550	1440	1600	3520
13	1780	3500	3000	2100	2200	1700	5820	2890	3350	1290	1800	3770
14	1530	3230	3000	2300	2200	1800	4990	2700	3530	1390	1800	4810
15	2390	3160	2900	2300	2000	1900	4430	2470	2730	2240	2000	4950
16	2110	3330	2700	2700	1800	1800	3820	2440	2450	2350	1900	4790
17	2100	3020	2400	3100	1600	1600	3520	2240	2160	2380	2000	3890
18	2060	3170	2700	3100	1800	1700	3380	1790	2230	2720	1800	3610
19	2040	3360	3000	2900	2000	2000	3530	2310	2330	2590	1900	3480
20	1950	2680	2780	2800	2100	2400	3880	2270	2740	2780	1800	2860
21	1540	2660	2880	2800	2100	2300	3900	2180	2500	3230	1750	3970
22	1980	3350	2830	2900	2000	1900	4900	2260	2330	4010	1740	8040
23	5370	3370	2530	2600	1900	1800	4920	2270	2230	3580	1720	9530
24	7690	3470	2600	2600	1800	1700	4060	1520	2040	3450	1450	9130
25	7900	3470	2600	2500	1800	1700	3950	1330	2060	3410	2060	8640
26	7750	3440	2600	2500	1900	1730	3680	1770	1890	2780	2600	6430
27	6230	3670	2400	2300	2000	1760	3590	1470	1960	2570	2970	5920
28	6170	3620	2400	2300	1900	1470	3290	1520	1670	2430	4710	5680
29	5750	3400	2400	2300	1800	1790	3480	1420	1890	2590	4260	5000
30	5450	3000	2400	2300	---	1710	3480	1700	1890	2660	4360	5260
31	4710	---	2400	2500	---	2010	---	2020	---	2570	4110	---
TOTAL	98390	120020	83440	74600	57900	55150	126240	75920	83660	70010	72690	143460
MEAN	3174	4001	2692	2406	1997	1779	4208	2449	2789	2258	2345	4782
MAX	7900	6410	3060	3100	2400	2400	8020	3470	4770	4010	4710	9530
MIN	1420	2660	2300	1800	1600	1470	2000	1330	1670	1050	1450	2860

CAL YR 1979 TOTAL 1392750 MEAN 3816 MAX 17100 MIN 1600
WTR YR 1980 TOTAL 1061480 MEAN 2900 MAX 9530 MIN 1050

04067000 MENOMINEE RIVER BELOW KOSS, MI

LOCATION.--Lat 45°21'16", long 87°38'55", in sec.9, T.34 N., R.27 W., Michigan Meridian, Menominee County, Hydrologic Unit 04030108, on left bank at powerplant of Wisconsin Public Service Corp., 0.5 mi (0.8 km) upstream from Little Cedar River, 3.6 mi (5.8 km) southeast of Koss, and at mile 24.7 (39.7 km).

DRAINAGE AREA.--3,730 mi² (9,660 km²), revised.

PERIOD OF RECORD.--July 1907 to March 1909 (published as "at Koss"), July 1913 to September 1980 (discontinued).

GAGE.--Headwater and tailwater gages and generation data entered hourly in daily log sheet by company employees. Prior to June 1913, chain gage on railroad bridge 4 mi (6.4 km) upstream.

REMARKS.--Daily discharges computed on basis of average daily load and load discharge rating of combined hydroelectric units. Flow regulated by powerplants, and by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on Michigamme River, and by many smaller reservoirs above station.

COOPERATION.--Records of daily discharge furnished by Wisconsin Public Service Corp. since 1913.

AVERAGE DISCHARGE.--68 years (water years 1908, 1914-80), 3,153 ft³/s (89.29 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 33,000 ft³/s (935 m³/s) May 10, 1960; minimum daily, 162 ft³/s (4.59 m³/s) Sept. 15, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 10,700 ft³/s (303 m³/s) Apr. 12; minimum daily, 1,020 ft³/s (28.9 m³/s) July 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1800	5310	3830	2740	2820	2060	2670	4150	3200	2210	2330	4460
2	2080	6620	2240	2440	2670	1800	3180	4150	3050	1910	2370	3070
3	2290	7220	1970	2840	2500	1720	3790	3930	4130	2140	2120	3930
4	2810	6760	2910	2600	2600	1760	3310	3770	5120	1890	2250	3830
5	2100	6810	3370	2540	2560	1930	3480	3330	4910	1840	2610	3860
6	1950	6150	3750	2420	2590	2160	4260	3410	4270	1530	2490	3820
7	1760	5990	2870	1480	2600	1950	4140	3070	4340	1340	2350	3400
8	1930	5500	2730	1520	2620	2230	4690	3160	4330	1020	2420	2930
9	1840	4900	2650	1970	2250	1800	7460	3180	3780	1630	2560	3420
10	1890	5270	3260	2330	1720	1720	9690	2740	3050	1800	2160	4870
11	2120	5110	3420	2670	1950	1720	10300	3280	4300	1250	2010	4680
12	2060	4800	3860	2420	1990	1950	10700	3240	4260	1570	1870	4660
13	2200	4040	2640	2310	2120	1840	7450	3190	3460	1530	2040	3530
14	1700	3180	2860	2520	2640	1950	6720	3260	3490	1550	2120	4260
15	1950	3490	3140	2800	2500	2100	5740	2820	3510	1890	2250	5520
16	2820	3240	3070	3050	2310	2010	5250	2760	3010	2270	2120	5390
17	2080	3670	2940	3220	1930	2010	4410	2350	2630	2440	2230	5330
18	2120	3120	2520	4010	1870	1550	3840	2650	2560	2440	2060	3680
19	2230	3130	3240	3750	2040	2240	3710	2100	2760	2650	2080	3910
20	1890	3430	3540	1570	2520	2780	3820	2740	3120	2820	1910	3420
21	1890	2930	2850	3200	2480	2840	4890	2460	3250	3050	1870	3310
22	2230	3430	3010	3140	2540	2780	5050	2460	2620	3720	1910	5700
23	4360	4040	2990	3050	2500	2060	6160	2370	2650	4650	1890	8250
24	6690	3720	2670	2530	2310	1930	5380	2270	2440	3300	1590	9460
25	8450	4030	2650	2950	2290	1870	4410	1460	2270	3240	1840	9330
26	8940	4520	2840	2690	2100	1890	4710	1340	2160	3530	2590	8800
27	8750	4730	2610	2840	2330	2100	3890	2230	2230	2710	3090	6830
28	7080	5120	3100	2540	2440	2120	3820	1840	1930	2120	4180	6300
29	6860	4390	2740	2630	2330	1930	3790	1700	2140	2610	5250	5410
30	6510	3220	2440	2500	---	1970	4200	1890	2370	2370	5210	5040
31	4950	---	2470	2610	---	2330	---	2100	---	2880	4670	---
TOTAL	107510	138070	92180	83900	67320	63130	155950	85450	97840	71900	78940	151400
MEAN	3468	4602	2974	2706	2321	2036	5198	2756	3261	2319	2546	5047
MAX	8940	7220	3860	4010	2820	2840	10700	4150	5120	4650	5250	9460
MIN	1700	2930	1970	1480	1720	1550	2670	1340	1930	1020	1590	2930

CAL YR 1979 TOTAL 1664770 MEAN 4561 MAX 23800 MIN 1570
WTR YR 1980 TOTAL 1193590 MEAN 3261 MAX 10700 MIN 1020

04067500 MENOMINEE RIVER NEAR McALLISTER, WI
(National stream-quality accounting network station)

LOCATION.--Lat 45°19'33", long 87°39'48", in SW¼ SE¼ sec.17, T.33 N., R.23 E., Marinette County, Hydrologic Unit 04030108, on right bank 85 ft (26 m) downstream from bridge on County Highway JJ, 2.9 mi (4.7 km) downstream from Grand Rapids Dam, 2.6 mi (4.2 km) east of McAllister, 1.9 mi (3.1 km) downstream from Little Cedar River, and at mile 22.6 (36.4 km).

DRAINAGE AREA.--3,930 mi² (10,200 km²), revised.

PERIOD OF RECORD.--March 1945 to September 1961, October 1961 to September 1979, miscellaneous measurements and peaks only, October 1979 to September 1980.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 622.20 ft (189.647 m) National Geodetic Vertical Datum of 1929 (Michigan Department of Transportation reference mark). Prior to May 15, 1945, nonrecording gage 1,400 ft (427 m) downstream at same datum; May 16, 1945, to September 1961, water-stage recorder 1,000 ft (305 m) downstream at same datum: October 1961 to September 1979, crest-stage gage 1,100 ft (335 m) downstream at same datum.

REMARKS.--Records good except those for winter period and period of no gage-height record, Oct. 1 to Nov. 15, which are fair. Flow regulated by powerplants, by Michigamme Reservoir, capacity, 119,950 acre-ft (148 hm³), and Peavy Pond, capacity, 33,860 acre-ft (41.7 hm³) on the Michigamme River, and by many smaller reservoirs above station.

AVERAGE DISCHARGE.--17 years (water years 1946-61, 1980), 3,402 ft³/s (96.34 m³/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 32,500 ft³/s (920 m³/s) May 9, 1960, gage height, 20.0 ft (6.096 m), from graph based on gage readings; minimum observed, 538 ft³/s (15.2 m³/s) Oct. 6, 1946, gage height, 7.29 ft (2.222 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 12,500 ft³/s (354 m³/s) Apr. 11, gage height, 14.65 ft (4.465 m); minimum daily 1,350 ft³/s (38.2 m³/s) July 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2000	6000	4330	3000	3200	2300	3010	4580	3050	2560	2930	4900
2	2100	7600	2800	2800	3000	2000	3520	4540	3420	2400	2890	3670
3	2600	8200	2400	3040	2800	1900	4300	4460	4230	2340	2670	4310
4	2300	7600	3600	2800	2700	2000	3930	4330	5030	2360	2440	4280
5	2500	7800	3600	2800	2400	2100	4390	4050	5110	2090	3090	4260
6	2200	7000	4040	2700	2900	2400	4740	4080	4490	2040	3550	4240
7	2000	6800	3600	1800	2700	2200	4720	3900	4590	1630	3080	4150
8	2200	6200	3400	1800	2700	2500	5290	3940	4670	1350	2940	3290
9	2100	5600	3100	2200	2600	2000	4610	3960	4380	1590	3030	3800
10	2200	6000	3590	2600	2000	1900	11600	3510	3440	2110	2820	5180
11	2400	5800	4220	1800	2200	1900	12300	3680	4400	1790	2570	4990
12	2400	5400	3810	2800	2200	2200	11400	3840	4310	1600	2200	4950
13	2500	4800	3000	2700	2400	2100	8440	3720	4190	1950	2440	4250
14	2000	3700	3600	2800	2700	2200	7480	3810	3960	1500	2290	4520
15	2200	3400	3800	3100	2800	2300	6320	3520	3820	1970	2710	5990
16	3100	3740	3600	3400	2600	2300	5690	3260	3600	2630	2400	5820
17	2600	3900	3500	3600	2200	2300	5110	2890	3130	2600	2540	5730
18	2400	3660	2900	4500	2100	1900	4670	3200	2880	2830	2350	4420
19	2600	3620	2600	4200	2300	2300	4550	2340	3250	2490	2420	4390
20	2200	3780	4000	4000	2800	3100	4500	3120	3540	3040	2280	4180
21	2200	3390	3400	3800	2800	3100	5320	2850	3900	3430	2150	4100
22	2600	3720	3360	3500	2800	3100	5380	2870	3090	4230	2010	5990
23	5000	4280	3400	3400	2800	2300	6260	2800	3150	4700	2260	9270
24	7800	4200	3100	3000	2600	2200	5770	2570	2830	3810	1980	10800
25	9600	4350	3240	3300	2400	2100	5430	2310	2450	3710	1610	10500
26	10000	4640	3100	3000	2400	2100	4910	1360	2520	3910	2660	9670
27	9800	4770	3200	3200	2600	2400	4360	2250	2600	3580	3510	7690
28	8000	5190	2900	2900	2600	2400	4450	2350	2290	2440	4680	6770
29	7800	4860	2900	2900	2600	2200	4410	1970	2400	2940	5650	6590
30	7400	4000	2900	2900	---	2200	4580	2000	2660	2890	5500	5550
31	6800	---	3000	2900	---	2800	---	2250	---	3110	5030	---
TOTAL	123200	154500	103840	94260	75400	70480	175420	100290	107780	82120	90680	168250
MEAN	3976	5150	3350	3041	2600	2274	5847	3235	3593	2649	2925	5608
MAX	10000	8200	4330	4500	3200	3100	12300	4580	5110	4700	5650	10800
MIN	2000	3390	2400	1800	2000	1900	3010	1360	2240	1350	1610	3290

WTR YR 1980 TOTAL 1346220 MEAN 3678 MAX 12300 MIN 1350

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--December 1977 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: June 1979 to current year.
WATER TEMPERATURES: June 1979 to current year.

EXTREMES FOR PERIOD OF DAILY RECORD--
SPECIFIC CONDUCTANCE: Maximum daily, 250 micromhos Mar. 12, 1980; minimum daily, 105 micromhos June 4, 1980.
WATER TEMPERATURES: Maximum daily, 26.0°C July 11, 1980; minimum daily, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 250 micromhos Mar. 12; minimum daily, 105 micromhos June 4.
WATER TEMPERATURES: Maximum daily, 26.0°C July 11; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
OCT										
24...	1245	5660	250	7.0	8.0	10.6	92	51	72	110
NOV										
20...	1600	6060	190	8.1	3.5	10.5	83	21	K5	94
DEC										
06...	1305	4400	170	8.1	.5	13.6	99	K6	K7	100
JAN										
09...	1330	2500	220	7.8	.0	13.6	98	K10	K1	110
FEB										
05...	1315	3000	250	7.2	.0	12.2	88	25	K5	110
MAR										
11...	1330	1800	190	7.4	.0	13.3	96	K11	K5	110
APR										
15...	1330	5360	230	8.2	6.0	14.0	112	--	--	92
MAY										
07...	1300	2420	--	--	--	--	--	--	--	--
14...	1330	5760	210	7.8	12.0	9.4	91	K7	K4	93
19...	1400	2170	--	--	--	--	--	--	--	--
JUN										
24...	1330	2570	180	8.0	23.0	7.3	88	K14	40	92
JUL										
24...	0915	3600	220	7.6	23.5	7.6	93	K9	28	96
AUG										
20...	1610	2500	260	8.1	23.0	7.9	95	K19	K14	110
SEP										
24...	1300	10600	250	7.6	13.0	10.0	99	350	220	87

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	ALKA-LINITY (MG/L AS CACO3)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT										
24...	15	26	12	0	2.3	.1	7	1.0	99	11
NOV										
20...	0	22	9.6	--	2.4	.1	5	1.2	147	11
DEC										
06...	17	21	11	0	2.7	.1	9	1.2	86	11
JAN										
09...	12	24	11	--	2.7	.1	9	1.2	93	14
FEB										
05...	15	26	12	0	2.9	.1	5	1.2	99	16
MAR										
11...	12	25	12	0	4.7	.2	8	1.9	100	15
APR										
15...	18	21	9.6	--	1.8	.1	4	1.3	74	8.9
MAY										
07...	--	--	--	--	--	--	--	--	--	--
14...	10	21	9.9	0	2.3	.1	5	.9	83	9.6
19...	--	--	--	--	--	--	--	--	--	--
JUN										
24...	4	21	9.5	0	3.0	.1	7	1.3	88	8.9
JUL										
24...	11	22	10	--	2.7	.1	6	1.0	85	11
AUG										
20...	16	25	12	0	2.4	.1	4	.8	94	10
SEP										
24...	14	20	9.0	0	1.9	.1	4	1.1	73	9.7

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, ORGANIC TOTAL (MG/L AS N)
OCT											
24...	3.2	.1	8.0	132	124	1940	.07	.10	.010	.010	.93
NOV											
20...	3.1	.0	8.8	123	148	1270	.16	.19	.050	.050	.48
DEC											
06...	3.2	.0	8.9	132	113	1570	.18	.15	.040	.010	.33
JAN											
09...	3.0	.1	10	131	123	920	.21	.21	.030	.030	.43
FEB											
05...	3.4	.1	11	143	134	1160	.25	.34	.110	.340	.21
MAR											
11...	3.4	.1	11	141	134	685	.29	.28	.050	.000	.20
APR											
15...	2.4	.1	7.0	106	97	1530	.17	.04	.040	.010	.46
MAY											
07...	<2.0	--	--	--	--	--	--	--	--	--	--
14...	2.6	.1	5.4	128	102	1920	.07	.12	.010	.020	.34
14...	<2.0	--	--	--	--	--	--	--	--	--	--
JUN											
24...	4.5	.1	5.9	146	108	1050	.06	.19	.050	.030	.38
JUL											
24...	2.6	.1	7.0	147	108	1380	.09	.03	.000	.020	.33
AUG											
20...	2.5	.1	8.5	131	118	884	.09	.07	.020	.020	.30
SEP											
24...	2.5	.1	10	137	99	3850	.14	.12	.020	.010	.68

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT										
24...	.94	1.0	4.5	.030	.09	.010	--	6	88	8
NOV										
20...	.53	.69	3.1	.020	--	.020	--	6	62	44
DEC										
06...	.37	.55	2.4	.020	.06	.010	9.1	1	12	100
JAN										
09...	.46	.67	3.0	.030	.09	.020	7.6	4	28	100
FEB										
05...	.32	.57	2.5	.020	.06	.020	--	9	73	65
MAR										
11...	.25	.54	2.4	.010	.03	.010	4.8	2	9.7	50
APR										
15...	.50	.67	3.0	.030	.09	.020	8.7	9	130	30
MAY										
07...	--	--	--	<.020	--	--	--	--	--	--
14...	.35	.42	1.9	.030	.09	.000	--	9	135	74
14...	--	--	--	.020	--	--	--	--	--	--
JUN										
24...	.43	.49	2.2	.030	.09	.020	--	10	72	77
JUL										
24...	.33	.42	1.9	.030	.09	.020	12	6	56	100
AUG										
20...	.32	.41	1.9	.050	.15	.030	--	1	6.7	100
SEP										
24...	.70	.84	3.7	.050	.15	.030	15	22	618	56

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT										
24...	1245	1	1	0	9	0	0	20	10	0
NOV										
20...	1400	--	--	--	--	--	--	--	--	--
FEB										
05...	1315	1	0	100	20	0	2	20	10	0
MAY										
07...	1300	--	--	--	--	--	--	--	--	--
14...	1330	1	1	<50	30	0	3	20	<10	0
14...	1400	--	--	--	--	--	--	--	--	--
AUG										
20...	1410	1	1	100	0	0	0	10	<10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT										
24...	0	3	2	500	100	0	0	140	20	<.1
NOV										
20...	--	--	--	--	--	--	--	--	--	--
FEB										
05...	0	2	2	300	140	0	0	20	8	.4
MAY										
07...	--	4	--	--	--	5	--	--	--	--
14...	0	3	2	290	110	1	0	70	20	.1
14...	--	5	--	--	--	<1	--	--	--	--
AUG										
20...	0	4	2	270	70	3	1	70	10	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT										
24...	<.1	1	1	0	0	0	10	10	7.8	.8
NOV										
20...	--	--	--	--	--	--	--	--	--	.3
FEB										
05...	.4	1	0	0	0	0	10	10	11	.5
MAY										
07...	--	<20	--	--	--	--	<20	--	--	--
14...	.1	0	0	0	0	0	20	30	14	--
14...	--	<20	--	--	--	--	<20	--	--	--
AUG										
20...	<.1	2	1	0	0	0	10	0	--	3.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
MAY						
14...	1330	101	1.20	1.60	4.00	.360

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 20,79	MAR 11,80	MAY 14,80	JUN 24,80
TIME	1400	1330	1330	1330
TOTAL CELLS/ML	300	250	2400	3500
DIVERSITY: DIVISION	1.2	1.4	1.2	1.3
.CLASS	1.2	1.4	1.3	1.3
..ORDER	1.5	1.5	2.0	1.3
...FAMILY	1.9	2.8	2.3	1.6
....GENUS	2.0	2.9	2.4	1.9

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	270	8
...OOCYSTACEAE								
....ANKISTRODESMUS	5	2	88#	35	78	3	*	0
....CHLORELLA	15	5	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	*	0
...SCENEDESMACEAE	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	630#	18
....SCENEDESMUS	--	-	--	-	350	14	290	8
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	78	3	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	59	2	29	1
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	25	8	5	2	1300#	53	190	5
....MELOSIRA	--	-	--	-	20	1	43	1
..PENNALES								
...ACHNANTHACEAE								
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	5	2	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	35	14	--	-	--	-
...FRAGILARIACEAE								
....FRAGILARIA	--	-	20	8	--	-	--	-
....SYNEDRA	5	2	15	6	200	8	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	15	5	25	10	--	-	--	-
...NAVICULACEAE								
....NAVICULA	25	8	15	6	20	1	--	-
...NITZSCHIACEAE								
....NITZSCHIA	15	5	15	6	98	4	*	0
...TABELLARIACEAE								
....TABELLARIA	5	2	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	--	-	--	-	20	1	--	-
.XANTHOPHYCEAE								
..HETEROCOCCALES								
...CHLOROTHECIACEAE								
....OPHIOCYTIUM	--	-	--	-	20	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	5	2	--	-	--	-

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 20,79 1400		MAR 11,80 1330		MAY 14,80 1330		JUN 24,80 1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	200	9	2000#	58
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
....SCHIZOTHRIX	190#	63	20	8	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	20	1	--	-

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUL 24,80	AUG 20,80	SEP 24,80
TIME	0000	1410	1300
TOTAL CELLS/ML	1900	6[illegible]0	160
DIVERSITY: DIVISION	1.7	1.8	1.7
.CLASS	1.7	1.8	1.7
..ORDER	2.2	2.7	2.1
...FAMILY	2.7	2.9	2.8
....GENUS	2.7	3.1	2.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)						
.CHLOROPHYCEAE						
..CHLOROCOCCALES						
...CHARACIACEAE						
....SCHROEDERIA	26	1	--	-	--	-
...COELASTRACEAE						
....COELASTRUM	130	7	--	-	--	-
...MICRACTINIACEAE						
....MICRACTINIUM	--	-	--	-	--	-
...OOCYSTACEAE						
....ANKISTRODESMUS	77	4	52	8	--	-
....CHLORELLA	--	-	--	-	--	-
....CHODATELLA	--	-	13	2	--	-
....DICTYOSPHAERIUM	--	-	--	-	13	8
....OOCYSTIS	51	3	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-
....TETRAEDRON	--	-	13	2	--	-
...SCENEDESMACEAE						
....CRUCIGENIA	--	-	--	-	--	-
....SCENEDESMUS	150	8	26	4	52#	33
..TETRASPORALES						
...COCCOMYXACEAE						
....ELAKATOTHRIX	--	-	--	-	--	-
..VOLVOCALES						
...CHLAMYDOMONADACEAE						
....CHLAMYDOMONAS	39	2	65	10	--	-
..ZYGNEMATALES						
...DESMIDIACEAE						
....COSMARIUM	--	-	13	2	--	-
CHRYSOPHYTA						
.BACILLARIOPHYCEAE						
..CENTRALES						
...COSCINODISCACEAE						
....CYCLOTELLA	390#	21	100#	16	26#	17
....MELOSIRA	--	-	--	-	--	-
..PENNALES						
...ACHNANTHACEAE						
....COCCONEIS	13	1	26	4	13	8
...CYMBELLACEAE						
....CYMBELLA	--	-	--	-	--	-
...DIATOMACEAE						
....DIATOMA	--	-	--	-	--	-
...FRAGILARIACEAE						
....FRAGILARIA	--	-	--	-	--	-
....SYNEDRA	--	-	13	2	--	-
...GOMPHONEMATACEAE						
....GOMPHONEMA	--	-	--	-	13	8
...NAVICULACEAE						
....NAVICULA	13	1	--	-	--	-
...NITZSCHIACEAE						
....NITZSCHIA	51	3	13	2	13	8
...TABELLARIACEAE						
....TABELLARIA	--	-	--	-	--	-
.CHRYSOPHYCEAE						
..CHRYSOMONADALES						
...CHROMULINACEAE						
....CHRYSOCOCCUS	--	-	--	-	--	-
.XANTHOPHYCEAE						
..HETEROCOCCALES						
...CHLOROTHECIACEAE						
....OPHIOCYTIUM	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)						
.CRYPTOPHYCEAE						
..CRYPTOMONADALES						
...CRYPTOCHRYSIDACEAE						
....CHROOMONAS	64	3	39	6	--	-
...CRYPTOMONADACEAE						
....CRYPTOMONAS	26	1	--	-	13	8

04067500 MENOMINEE RIVER NEAR MCALLISTER, WI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUL 24,80 0800		AUG 20,80 1410		SEP 24,80 1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)						
.CYANOPHYCEAE						
..CHROOCOCCALES						
...CHROOCOCCACEAE						
....ANACYSTIS	61	3	65	10	13	8
..HORMOGONALES						
...OSCILLATORIACEAE						
....OSCILLATORIA	770#	42	210#	32	--	-
....SCHIZOTHRIX	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)						
.EUGLENOPHYCEAE						
..EUGLENALES						
...EUGLENACEAE						
....TRACHELOMONAS	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04067500 MENOMINEE RIVER NEAR McALLISTER, WI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		170	185	---	220	240	230	170	225	180	185	205
2		165	210	205	225	225	220	165	210	185	---	205
3		160	200	215	230	225	220	170	205	190	190	195
4		160	225	210	225	235	220	175	105	190	185	190
5		160	205	210	220	235	215	170	200	195	185	185
6		165	205	215	220	235	210	175	185	190	195	180
7		170	195	210	220	230	210	180	190	195	190	175
8		165	190	210	220	235	205	175	185	195	190	180
9		165	200	215	215	225	180	180	195	195	190	180
10		165	195	---	215	235	170	180	210	200	200	185
11		200	210	---	215	240	165	175	210	200	220	185
12		170	200	---	215	250	160	185	200	200	210	185
13		165	210	215	220	245	160	180	180	200	210	185
14		170	225	---	225	240	165	180	170	210	210	185
15		175	210	200	215	245	165	185	175	210	220	190
16		175	200	215	240	250	170	185	175	210	200	195
17		180	200	210	210	245	165	190	175	210	210	195
18		175	210	200	225	245	170	195	175	210	210	195
19		175	215	215	205	240	175	190	175	210	200	195
20		185	200	215	235	230	175	195	185	195	200	200
21		175	200	220	200	235	175	195	180	195	200	200
22		185	185	210	210	230	170	200	185	200	200	210
23		190	195	230	210	225	175	215	185	200	200	195
24		180	195	235	210	225	175	220	180	195	210	180
25		175	200	235	215	230	180	220	180	---	220	175
26		180	205	230	225	235	175	220	185	---	215	170
27		190	200	230	230	245	175	225	190	---	200	170
28		180	205	230	225	245	180	220	185	---	205	160
29		175	205	230	220	---	175	225	195	---	210	160
30		190	205	235	---	240	175	230	185	185	215	160
31		---	215	230	---	240	---	235	---	190	205	---
MAX		200	225		240		230	235	225			210
MIN		160	195		200		160	165	105			160

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1		6.5	.5	.0	.0	.0	---	11.5	17.5	21.0	24.0	20.0
2		6.0	.5	.0	.0	.0	1.0	13.5	17.5	20.5	---	20.0
3		5.5	.5	.0	.0	.0	1.0	14.0	19.0	22.0	22.0	19.5
4		5.0	.5	.0	.0	.0	1.5	15.5	19.0	23.0	23.0	19.5
5		5.0	.5	.0	.0	.0	2.5	16.0	18.0	21.5	22.0	19.5
6		4.5	.5	.0	.0	.0	3.0	14.5	19.5	21.0	23.5	19.5
7		3.5	.5	.0	.0	.0	2.0	12.0	19.5	23.0	25.0	20.0
8		3.0	.5	.0	.0	.0	3.0	11.5	19.5	24.0	24.0	19.5
9		2.0	.5	.0	.0	.0	3.0	11.0	17.0	25.0	24.0	---
10		2.0	.5	.0	.0	.0	3.0	12.5	16.5	24.5	23.5	---
11		1.0	.5	.0	.0	.0	3.5	11.5	17.0	26.0	23.0	---
12		---	.5	.0	.0	.0	2.0	13.0	19.5	24.5	22.5	---
13		---	.5	.0	.0	.0	2.5	12.0	19.0	24.5	22.5	---
14		---	.5	.0	.0	.0	2.0	12.5	14.5	25.0	22.0	---
15		---	.5	.0	.0	.0	2.0	13.0	17.5	25.0	22.5	---
16		---	.5	.0	.0	.0	3.5	14.0	18.0	25.0	22.0	---
17		---	.0	.0	.0	.0	---	14.0	19.0	25.0	22.0	---
18		---	.0	.0	.0	.0	7.0	14.0	---	23.5	20.5	---
19		---	.0	.0	.0	.0	8.5	16.5	17.0	24.0	22.0	---
20		---	.0	.0	.0	.0	9.0	17.5	18.0	24.5	22.5	---
21		---	.0	.0	.0	.0	10.5	18.5	20.0	---	23.0	---
22		---	.0	.0	.0	.0	12.0	19.5	20.0	24.0	23.0	14.5
23		---	.0	.0	.0	.0	10.5	20.5	22.0	23.0	23.0	---
24		---	.0	.0	.0	.0	9.0	20.5	24.0	23.5	23.0	---
25		.5	.0	.0	.0	.0	10.0	20.5	24.0	---	22.0	---
26		.5	.0	.0	.0	.0	10.5	20.5	25.0	---	22.5	---
27		.5	.0	.0	.0	.0	9.0	20.0	22.5	---	22.0	---
28		.5	.0	.0	.0	.0	10.0	19.5	19.0	---	20.0	---
29		.5	.0	.0	.0	.0	10.5	19.0	21.0	---	20.0	---
30		.5	.0	.0	---	.0	11.0	19.5	20.5	23.0	20.0	---
31		---	.0	.0	---	.0	---	18.5	---	22.0	20.0	---
MAX			.5	.0	.0	.0		20.5			25.0	
MIN			.0	.0	.0	.0		11.0			20.0	

04096400 ST. JOSEPH RIVER NEAR BURLINGTON, MI

LOCATION.--Lat 42°06'10", long 85°02'25", in SW¼ SW¼ sec.20, T.4 S., R.6 W., Calhoun County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) upstream from bridge on 13 Mile Rd., 2.0 mi (3.2 km) east of Burlington, 4.0 mi (6.4 km) downstream from Tekonsha Creek, and at mile 164 (264 km).

DRAINAGE AREA.--201 mi² (521 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 163 ft³/s (4.616 m³/s), 11.01 in/yr (280 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,030 ft³/s (29.2 m³/s), Mar. 6, 1976, gage height, 5.31 ft (1.618 m); maximum gage height, 5.51 ft (1.679 m) Feb. 5, 1968; minimum discharge, 8.0 ft³/s (0.23 m³/s) Aug. 9, 10, 11, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 755 ft³/s (21.4 m³/s), June 8, gage height, 4.61 ft (1.405 m); minimum, 42 ft³/s (1.19 m³/s) Oct. 1, gage height, 1.60 ft (0.488 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	43	93	185	298	91	138	386	304	244	153	140	329
2	51	93	177	280	91	130	366	300	281	152	164	413
3	54	89	165	260	95	130	377	293	456	141	215	378
4	51	84	156	238	100	125	365	280	548	144	210	344
5	49	80	163	217	100	130	524	261	491	162	205	320
6	52	78	156	192	100	129	498	244	495	178	197	292
7	58	80	155	168	100	124	493	229	542	199	183	262
8	58	78	160	166	100	109	500	216	718	211	163	238
9	59	78	158	173	95	127	545	207	717	219	146	219
10	56	85	152	178	95	121	569	199	677	209	139	202
11	55	88	147	200	95	116	551	202	677	196	144	186
12	57	88	156	215	95	116	523	199	656	198	155	176
13	58	84	159	202	95	118	494	204	618	194	149	170
14	57	81	156	185	93	114	479	206	580	181	249	164
15	56	78	151	193	90	112	509	207	544	168	287	159
16	55	78	147	175	90	127	497	208	503	179	276	155
17	55	77	150	187	90	337	465	220	433	193	271	213
18	56	77	137	199	90	505	441	295	377	175	270	237
19	58	77	123	198	94	462	420	302	338	159	254	234
20	57	78	137	193	100	486	405	298	311	148	288	223
21	56	80	135	184	107	547	386	291	281	137	328	206
22	58	91	136	176	164	590	365	278	261	131	313	192
23	76	120	154	169	227	583	338	268	244	125	292	195
24	82	141	201	154	231	577	313	256	228	119	280	194
25	86	151	323	142	219	583	297	239	216	110	276	192
26	83	186	342	130	201	549	281	213	204	105	267	184
27	79	199	325	120	189	507	268	194	190	104	247	173
28	76	203	318	110	181	469	287	182	177	136	220	163
29	75	198	315	105	170	450	301	176	166	161	192	154
30	72	192	316	100	---	427	303	177	155	159	169	147
31	73	---	311	95	---	406	---	240	---	154	175	---
TOTAL	1911	3205	5966	5602	3588	9444	12546	7388	12328	5000	6864	6714
MEAN	61.6	107	192	181	124	305	418	238	411	161	221	224
MAX	86	203	342	298	231	590	569	304	718	219	328	413
MIN	43	77	123	95	90	109	268	176	155	104	139	147
CFSM	.31	.53	.96	.90	.62	1.52	2.08	1.18	2.05	.80	1.10	1.11
IN.	.35	.59	1.10	1.04	.66	1.75	2.32	1.37	2.28	.93	1.27	1.24

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CAL YR 1979   TOTAL   58288   MEAN 160   MAX 711   MIN 43   CFSM  .80   IN 10.79
WTR YR 1980   TOTAL   80556   MEAN 220   MAX 718   MIN 43   CFSM 1.10   IN 14.91
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04096515 HOG CREEK NEAR ALLEN, MI

LOCATION.--Lat 41°56'55", long 84°49'40", in NE¼ SE¼ sec.13, T.6 S., R.5 W., Branch County, Hydrologic Unit 04050001, on left bank 12 ft (4 m) downstream from bridge on U.S. Highway 12, 1.0 mi (1.6 km) downstream from Little Hog Creek, and 3.1 mi (5.0 km) west of Allen.

DRAINAGE AREA.--48.7 mi² (126.1 km²).

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,010 ft (308 m) from topographic map. Prior to May 23, 1970, nonrecording gage at same site and datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature [illegible] made during the year.

AVERAGE DISCHARGE.--11 years, 40.2 ft³/s (1.138 m³/s), 11.21 in/yr (285 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 426 ft³/s (12.1 m³/s) June 28, 1978, gage height, 5.78 ft (1.762 m); minimum, 1.2 ft³/s (0.034 m³/s) Aug. 20, 21, 1971; minimum gage height, 1.33 ft (0.405 m) Sept. 30, Oct. 1, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 212 ft³/s (6.00 m³/s) Mar. 19, gage height, 4.60 ft (1.402 m); minimum, 3.7 ft³/s (0.105 m³/s) Oct. 1, gage height, 1.33 ft (0.405 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	10	35	67	20	33	104	66	32	15	22	55
2	4.8	13	31	60	20	27	102	61	58	15	21	87
3	5.2	10	28	53	20	23	102	55	101	13	46	93
4	5.2	9.3	26	48	20	21	127	50	124	15	56	82
5	5.2	8.5	24	45	21	20	150	45	127	34	49	67
6	5.5	8.3	28	38	21	19	148	41	114	57	40	51
7	7.2	8.0	28	35	21	19	135	36	108	54	32	41
8	6.5	7.4	31	35	21	20	124	33	144	40	26	34
9	5.8	8.3	28	35	21	21	119	31	173	34	22	31
10	5.6	13	26	36	21	21	119	29	164	41	22	30
11	5.4	10	26	45	21	21	118	32	139	38	26	27
12	6.1	8.3	28	47	21	21	115	34	117	36	27	24
13	5.8	8.8	29	48	21	21	108	40	101	65	24	23
14	5.2	9.3	25	40	21	21	105	44	86	77	39	23
15	4.8	9.4	23	33	20	22	108	40	77	69	53	21
16	4.7	10	21	31	20	37	111	35	72	56	48	20
17	4.8	9.5	21	42	20	115	107	37	64	46	37	37
18	4.8	9.1	20	47	20	176	98	79	55	38	39	59
19	4.3	8.7	20	44	20	200	89	97	47	31	50	56
20	4.4	9.3	19	37	25	171	81	94	45	26	58	44
21	4.6	9.7	19	34	30	156	73	83	40	22	69	35
22	5.6	15	23	31	42	150	66	71	34	21	76	33
23	12	25	36	30	50	142	60	61	30	19	75	41
24	12	32	55	29	56	132	54	53	27	15	68	46
25	9.8	30	89	27	50	128	51	47	26	13	58	41
26	9.0	39	107	26	45	125	47	40	23	12	48	35
27	9.6	46	111	25	43	117	45	35	21	11	40	31
28	10	45	106	24	39	106	61	31	19	21	33	27
29	8.8	44	96	22	35	103	73	28	17	54	27	24
30	8.0	39	85	21	---	103	72	28	15	63	23	22
31	7.8	---	75	21	---	103	---	29	---	47	25	---
TOTAL	202.2	512.9	1319	1156	805	2394	2872	1485	2200	1098	1279	1240
MEAN	6.52	17.1	42.5	37.3	27.8	77.2	95.7	47.9	73.3	35.4	41.3	41.3
MAX	12	46	111	67	56	200	150	97	173	77	76	93
MIN	3.7	7.4	19	21	20	19	45	28	15	11	21	20
CFSM	.13	.35	.87	.77	.57	1.59	1.97	.98	1.51	.73	.85	.85
IN.	.15	.39	1.01	.88	.61	1.83	2.19	1.13	1.68	.84	.98	.95

CAL YR 1979 TOTAL 11714.4 MEAN 32.1 MAX 246 MIN 3.7 CFSM .66 IN 8.95
WTR YR 1980 TOTAL 16563.1 MEAN 45.3 MAX 200 MIN 3.7 CFSM .93 IN 12.65

04096600 COLDWATER RIVER NEAR HODUNK, MI

LOCATION.--Lat 42°01'45", long 85°06'25", in NW¼ NE¼ sec.22, T.5 S., R.7 W., Branch County, Hydrologic Unit 04050001, on downstream side of bridge on Girard Rd., 2.5 mi (4.0 km) northwest of Hodunk, and 3.5 mi (5.6 km) upstream from mouth.

DRAINAGE AREA.--293 mi² (759 km²).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WDR MI-76-1: 1974.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 26, 1963, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 234 ft³/s (6.627 m³/s), 10.85 in/yr (276 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,930 ft³/s (54.7 m³/s) June 28, 1978, gage height, 7.77 ft (2.368 m); minimum, 6.2 ft³/s (0.18 m³/s) Sept. 26, 1964; minimum gage height, 2.28 ft (0.695 m) Oct. 4-14, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,600 ft³/s (45.3 m³/s) June 9, gage height, 7.26 ft (2.213 m); minimum, 45 ft³/s (1.27 m³/s) Oct. 1, gage height, 2.69 ft (0.820 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	45	206	241	400	206	218	669	304	289	99	234	401
2	50	195	225	370	190	213	653	299	380	99	239	703
3	50	184	200	343	177	190	660	292	790	99	286	784
4	50	171	218	320	181	188	797	281	1090	111	313	718
5	49	160	213	296	185	187	940	271	1100	184	288	635
6	51	151	214	250	161	177	956	261	946	247	266	558
7	57	143	221	230	156	181	902	246	1020	320	249	496
8	57	139	221	220	152	177	863	235	1220	586	234	442
9	54	137	220	220	152	176	844	200	1520	542	222	382
10	51	141	213	230	148	183	846	150	1470	515	222	239
11	50	140	209	250	146	181	842	155	1280	489	233	239
12	52	137	214	253	146	175	822	160	1140	470	237	239
13	52	130	216	254	147	183	789	172	1010	534	230	239
14	51	125	211	256	142	180	772	180	902	572	321	234
15	49	123	201	244	142	182	776	180	822	516	449	228
16	49	121	195	237	138	200	793	176	760	489	436	228
17	49	119	181	250	135	409	758	181	704	469	385	274
18	48	116	180	269	141	601	708	323	642	348	357	345
19	48	115	189	269	138	760	670	491	596	240	351	348
20	47	114	176	258	136	752	631	487	555	234	365	323
21	47	115	170	245	139	778	590	452	515	227	424	296
22	50	125	178	231	198	794	552	411	476	223	464	274
23	60	149	208	226	269	766	512	376	385	219	438	277
24	64	170	264	217	285	724	482	348	252	212	389	285
25	73	182	400	205	275	795	457	328	211	204	352	274
26	82	220	509	200	243	898	436	307	200	198	306	257
27	88	249	525	200	228	821	415	287	200	193	206	247
28	87	261	490	200	225	748	426	269	193	213	198	236
29	130	258	464	190	210	703	403	252	187	236	192	228
30	228	250	476	190	---	685	303	256	144	241	189	221
31	212	---	439	182	---	670	---	284	---	243	200	---
TOTAL	2130	4846	8271	7705	5191	13903	20267	8614	21007	9572	9275	10650
MEAN	68.7	162	267	249	179	448	676	278	700	309	299	355
MAX	228	261	525	400	285	898	956	491	1520	586	464	784
MIN	45	114	170	182	135	175	303	150	144	99	189	221
CFSM	.23	.55	.91	.85	.61	1.53	2.31	.95	2.39	1.06	1.02	1.21
IN.	.27	.62	1.05	.98	.66	1.77	2.57	1.09	2.67	1.22	1.18	1.35

CAL YR 1979 TOTAL 76336 MEAN 209 MAX 1160 MIN 45 CFSM .71 IN 9.69
WTR YR 1980 TOTAL 121431 MEAN 332 MAX 1520 MIN 45 CFSM 1.13 IN 15.42

04096900 NOTTAWA CREEK NEAR ATHENS, MI

LOCATION.--Lat 42°03'20", long 85°18'30", in NW¼ sec.12, T.5 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on Shorts Road, 4.2 mi (6.8 km) southwest of Athens, and 5.0 mi (8.0 km) downstream from Pine Creek.

DRAINAGE AREA.--162 mi² (420 km²).

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 142 ft³/s (4.021 m³/s), 11.90 in/yr (302 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) June 29, 1978, gage height, 6.47 ft (1.972 m); minimum, 21 ft³/s (0.59 m³/s) July 28, 29, 30, Aug. 4, 6, 1977; minimum gage height, 0.37 ft (0.113 m) Oct. 16, 18, 20, 21, Nov. 8, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 442 ft³/s (12.5 m³/s) Mar. 21, gage height, 3.45 ft (1.052 m); maximum gage height, 3.93 ft (1.198 m) Aug. 22; minimum discharge, 41 ft³/s (1.16 m³/s) Oct. 1, gage height, 0.90 ft (0.274 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	42	77	158	180	69	120	228	162	175	98	86	153
2	50	81	139	168	69	110	224	156	208	101	100	212
3	50	83	144	153	70	100	226	150	278	97	127	242
4	52	83	129	131	70	95	276	142	309	119	139	245
5	52	82	108	120	70	85	318	135	305	172	137	240
6	57	79	117	120	70	84	314	127	290	167	133	223
7	63	74	123	115	70	82	296	121	300	169	125	200
8	64	72	129	113	70	91	278	118	381	240	117	176
9	65	74	118	108	70	93	293	116	427	240	107	154
10	65	78	116	105	70	83	317	117	420	226	102	137
11	64	82	123	131	70	85	332	130	390	212	99	123
12	66	82	132	222	70	85	325	129	344	193	98	113
13	65	80	136	166	70	94	310	135	292	187	95	107
14	64	77	128	141	70	79	293	150	247	175	126	107
15	62	76	112	131	70	82	292	147	216	157	148	106
16	61	76	111	127	70	97	291	141	204	154	160	105
17	60	75	105	144	70	237	273	141	205	169	175	140
18	60	74	105	166	70	369	253	190	195	170	193	175
19	61	74	101	164	70	407	231	237	180	157	201	200
20	61	78	90	148	75	430	214	229	171	146	214	201
21	60	83	86	129	81	438	195	207	162	135	259	194
22	61	98	89	126	146	425	180	182	149	129	298	184
23	73	120	107	116	211	388	166	158	137	117	298	179
24	80	138	161	110	216	346	155	142	128	106	275	171
25	84	140	282	100	207	315	152	134	123	98	245	161
26	82	170	343	95	236	289	148	121	117	93	212	149
27	80	200	300	90	189	260	146	111	111	89	181	136
28	76	198	260	85	137	236	149	106	106	92	154	127
29	71	194	230	80	138	228	161	106	104	95	132	119
30	68	181	210	75	---	227	163	111	101	95	116	112
31	65	---	190	70	---	227	---	151	---	91	112	---
TOTAL	1984	3079	4682	3929	2964	6287	7199	4502	6775	4489	4964	4891
MEAN	64.0	103	151	127	102	203	240	145	226	145	160	163
MAX	84	200	343	222	236	438	332	237	427	240	298	245
MIN	42	72	86	70	69	79	146	106	101	89	86	105
CFSM	.40	.64	.93	.78	.63	1.25	1.48	.90	1.40	.90	.99	1.01
IN.	.46	.71	1.08	.90	.68	1.44	1.65	1.03	1.56	1.03	1.14	1.12

CAL YR 1979 TOTAL 52053 MEAN 143 MAX 636 MIN 41 CFSM .88 IN 11.95
WTR YR 1980 TOTAL 55745 MEAN 152 MAX 438 MIN 42 CFSM .94 IN 12.80

04097170 PORTAGE RIVER NEAR VICKSBURG, MI

LOCATION.--Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050001, on right bank 15 ft (5 m) upstream from bridge on W Avenue, 2.4 mi (3.9 km) east of Vicksburg.

DRAINAGE AREA.--68.2 mi² (176.6 km²).

PERIOD OF RECORD.--March 1946 to September 1951, October 1964 to December 1979 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Water-stage recorder. Datum of gage is 839.94 ft (265.014 m) National Geodetic Vertical Datum of 1929. Mar. 13, 1946 to Sept. 30, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good.

AVERAGE DISCHARGE.--20 years, 61.2 ft³/s (1.733 m³/s), 12.19 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 356 ft³/s (10.1 m³/s) Apr. 7, 1947, gage height, 5.66 ft (1.725 m); minimum, 9.8 ft³/s (0.28 m³/s) Aug. 2, 3, 1977, gage height, 3.04 ft (0.927 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October to December, 119 ft³/s (3.37 m³/s) Dec. 25, gage height, 4.62 ft (1.408 m); minimum, 30 ft³/s (0.85 m³/s) Oct. 1, gage height, 3.47 ft (1.058 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	41	84									
2	32	44	81									
3	32	43	75									
4	32	42	71									
5	31	41	69									
6	32	40	72									
7	35	40	71									
8	34	39	74									
9	34	40	69									
10	34	42	67									
11	35	41	66									
12	36	40	71									
13	36	39	69									
14	35	39	67									
15	35	38	63									
16	34	38	61									
17	35	37	55									
18	35	37	54									
19	35	36	53									
20	35	36	53									
21	36	39	53									
22	37	48	54									
23	40	57	59									
24	42	59	72									
25	40	60	113									
26	39	83	118									
27	38	91	116									
28	38	92	113									
29	37	91	108									
30	36	87	104									
31	36	---	99									
TOTAL	1096	1500	2354	---	---	---	---	---	---	---	---	---
MEAN	35.4	50.0	75.9	---	---	---	---	---	---	---	---	---
MAX	42	92	118	---	---	---	---	---	---	---	---	---
MIN	30	36	53	---	---	---	---	---	---	---	---	---
CFSM	.52	.73	1.11	---	---	---	---	---	---	---	---	---
IN.	.60	.82	1.28	---	---	---	---	---	---	---	---	---

CAL YR 1979 TOTAL 25645 MEAN 70.3 MAX 217 MIN 30 CFSM 1.03 IN 13.99

04097500 ST. JOSEPH RIVER AT THREE RIVERS, MI

LOCATION.--Lat 41°56'25", long 85°38'00", in SW¼ SE¼ sec.18, T.6 S., R.11 W., St. Joseph County, Hydrologic Unit 04050001, on right bank in Scidmore Park at Three Rivers, 250 ft (76 m) downstream from Rocky River, and at mile 112 (180 km).

DRAINAGE AREA.--1,350 mi² (3,496 km²).

PERIOD OF RECORD.--May 1953 to current year.

REVISED RECORDS.--WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 781.34 ft (238.152 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. Flow regulated by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 1,108 ft³/s (31.38 m³/s), 11.15 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,810 ft³/s (165 m³/s) Mar. 7, 1976, gage height, 9.08 ft (2.768 m); minimum daily, 78 ft³/s (2.21 m³/s) Sept. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1918, 8,260 ft³/s (234 m³/s) Apr. 27, 1950, gage height, 10.6 ft (3.23 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,540 ft³/s (157 m³/s) June 7, gage height, 8.87 ft (2.704 m); minimum, 430 ft³/s (12.2 m³/s) Oct. 1, gage height, 2.70 ft (0.823 m); minimum daily, 480 ft³/s (13.6 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	480	799	1520	1980	1010	1290	2520	1690	1420	1020	1070	1410
2	529	930	1430	2030	1010	1170	2440	1410	1630	951	1030	1720
3	518	833	1360	1950	945	1100	2330	1520	2270	891	1070	1990
4	530	905	1320	1850	925	990	2560	1610	2260	867	1180	2640
5	643	892	1240	1680	929	1070	2680	1510	2780	1020	1220	2440
6	500	827	1240	1440	923	1080	2810	1470	3000	1570	1240	2310
7	516	704	1310	1370	913	1000	2970	1390	3490	1430	1230	2190
8	659	845	1350	1220	903	1060	2940	1210	4060	1330	1150	1880
9	754	678	1330	1060	902	1050	2940	1230	4480	1720	1040	1820
10	564	826	1380	1160	766	1080	3040	1160	4740	1950	1180	1790
11	522	795	1270	1390	794	997	3130	1350	4560	1780	1050	1690
12	638	809	1290	1490	869	933	3080	1240	4360	1650	1170	1510
13	595	693	1320	1410	903	1030	2990	1160	3860	1670	1050	1340
14	682	846	1340	1480	888	1040	2940	1200	3570	1680	1040	1270
15	613	679	1270	1440	933	925	2810	1180	3310	1590	1220	1270
16	569	646	1290	1420	901	1020	2820	1190	2910	1500	1280	1230
17	593	769	1140	1440	687	1410	2740	1290	2750	1640	1630	1410
18	597	610	954	1470	827	2020	2600	1340	2640	1450	1690	1490
19	587	702	997	1390	902	2670	2470	1390	2410	1320	1590	1550
20	521	856	1020	1520	900	2950	2450	1500	2190	1350	1820	1550
21	535	910	996	1460	910	3020	2270	1720	2060	1320	1930	1600
22	659	867	951	1360	974	3070	2180	1710	2040	988	1930	1560
23	641	777	1020	1350	1280	3060	2080	1620	1820	1010	1910	1550
24	701	986	1250	1310	1620	3020	1980	1550	1560	947	1890	1560
25	661	1100	1610	1270	1720	2960	1900	1470	1540	989	1820	1470
26	720	1340	2110	1180	1590	2980	1820	1370	1320	947	1790	1410
27	713	1520	2590	1160	1540	2880	1790	1320	1280	857	1630	1310
28	679	1550	2540	1090	1510	2770	1600	1220	1200	869	1370	1320
29	655	1610	2440	971	1390	2740	1610	1220	1120	886	1430	1320
30	605	1530	2340	1010	---	2740	1840	1140	990	919	1250	1240
31	645	---	2180	1040	---	2610	---	1110	---	1030	1150	---
TOTAL	18824	27834	45398	43391	30364	57735	74330	42490	77620	39061	42970	48840
MEAN	607	928	1464	1400	1047	1862	2478	1371	2587	1260	1386	1628
MAX	754	1610	2590	2030	1720	3070	3130	1720	4740	1950	1930	2640
MIN	480	610	951	971	687	925	1600	1110	990	857	1030	1230
CFSM	.45	.69	1.08	1.04	.78	1.38	1.84	1.02	1.92	.93	1.03	1.21
IN.	.52	.77	1.25	1.20	.84	1.59	2.05	1.17	2.14	1.08	1.18	1.35

CAL YR 1979 TOTAL 456444 MEAN 1251 MAX 4190 MIN 390 CFSM .93 IN 12.58
WTR YR 1980 TOTAL 548857 MEAN 1500 MAX 4740 MIN 480 CFSM 1.11 IN 15.12

04097540 PRAIRIE RIVER NEAR NOTTAWA, MI

LOCATION.--Lat 41°53'18", long 85°24'34", in NW¼ SW¼ sec.6, T.7 S., R.9 W., St. Joseph County, Hydrologic Unit 04050001, on left bank 10 ft (3 m) upstream from bridge on State Highway 66, 3.0 mi (4.8 km) upstream from unnamed tributary, and 3.0 mi (4.8 km) southeast of Nottawa.

DRAINAGE AREA.--106 mi² (275 km²).

PERIOD OF RECORD.--October 1962 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of indefinite stage-discharge relation, June 8-15, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 88.5 ft³/s (2.506 m³/s), 11.34 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 523 ft³/s (14.8 m³/s), Mar. 6, 1976, gage height, 5.66 ft (1.725 m); maximum gage height, 5.86 ft (1.786 m) June 9, 1980, caused by bridge construction; minimum discharge, 11 ft³/s (0.31 m³/s), Aug. 9, 10, Sept. 8, 9, 10, 1964; minimum gage height, 1.77 ft (0.539 m) Aug. 9, 10, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 375 ft³/s (10.6 m³/s) June 9, based on runoff correlation methods; maximum gage height, 5.86 ft (1.786 m) June 9, caused by bridge construction; minimum discharge, 31 ft³/s (0.88 m³/s) Oct. 1, gage height, 2.32 ft (0.707 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	32	60	120	145	60	90	165	131	95	93	71	120
2	37	64	114	137	60	85	166	128	123	89	71	174
3	40	64	108	130	60	75	170	123	153	84	74	214
4	42	63	103	124	60	71	194	117	186	81	73	215
5	41	61	101	119	60	70	208	111	210	89	70	195
6	42	59	101	114	60	70	233	106	219	93	68	169
7	48	57	102	112	60	73	242	102	272	94	65	147
8	50	57	104	107	60	74	239	98	300	90	61	132
9	49	57	103	105	60	74	245	96	350	88	58	121
10	48	61	101	104	60	73	241	93	370	87	62	112
11	47	62	99	104	60	75	234	93	350	85	65	104
12	47	63	99	133	60	75	227	96	330	84	71	98
13	47	61	98	109	60	78	216	95	300	85	73	96
14	46	60	96	104	60	81	212	95	270	86	76	98
15	44	58	94	101	60	80	209	93	250	86	75	95
16	44	58	92	99	61	86	206	90	227	87	75	91
17	44	57	89	102	62	128	204	92	202	84	82	107
18	44	56	85	104	63	168	195	108	183	80	94	117
19	46	55	80	106	65	193	182	117	170	77	95	122
20	48	55	81	105	66	204	172	125	161	75	104	120
21	49	57	80	102	67	211	163	127	149	73	111	113
22	51	63	82	100	87	202	153	122	139	70	110	107
23	59	75	90	97	114	195	145	114	129	66	105	105
24	61	86	111	90	127	196	140	108	124	61	97	100
25	62	93	144	85	125	195	135	101	118	56	89	96
26	61	111	166	80	175	188	130	96	113	53	83	93
27	60	122	182	75	105	184	126	93	108	52	76	91
28	56	131	189	70	101	176	125	87	103	56	71	87
29	57	130	181	66	95	172	126	81	98	59	67	84
30	56	125	169	62	---	165	130	79	94	65	63	82
31	55	---	156	61	---	165	---	87	---	70	69	---
TOTAL	1515	2181	3520	3152	2213	3972	5533	3204	5896	2398	2424	3605
MEAN	48.9	72.7	114	102	76.3	128	184	103	197	77.4	78.2	120
MAX	62	131	189	145	175	211	245	131	370	94	111	215
MIN	32	55	80	61	60	70	125	79	94	52	58	82
CFSM	.46	.69	1.08	.96	.72	1.21	1.74	.97	1.86	.73	.74	1.13
IN.	.53	.77	1.24	1.11	.78	1.39	1.94	1.12	2.07	.84	.85	1.27

CAL YR 1979 TOTAL 32555 MEAN 89.2 MAX 412 MIN 28 CFSM .84 IN 11.42
WTR YR 1980 TOTAL 39613 MEAN 108 MAX 370 MIN 32 CFSM 1.02 IN 13.90

04097970 LIME LAKE OUTLET AT PANAMA, IN

LOCATION.--Lat 41°42'46", long 85°07'10", in NW¼ NW¼ sec.35, T.38 N., R.12 E., Steuben County, Hydrologic Unit 04050001, on right bank 10 ft (3 m) downstream from dam for Lime Lake, 30 ft (9 m) upstream from bridge on Orland Road, and 0.7 mile (1.1 km) northwest of Panama.

DRAINAGE AREA.--17.5 mi² (45.3 km²), of which 3.68 mi² (9.53 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 950.00 ft (289.560 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for winter periods which are poor. Occasional regulation by control structure for Lime Lake.

AVERAGE DISCHARGE.--11 years, 6.70 ft³/s (0.190 m³/s), 5.20 in/yr (132 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34 ft³/s (0.96 m³/s) Mar. 5, 1976, gage height, 4.59 ft (1.399 m); maximum gage height, 4.61 ft (1.405 m) June 7, 1980; no flow at times during 1971 and 1972.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 28 ft³/s (0.79 m³/s) June 7, gage height, 4.61 ft (1.405 m); minimum daily, 0.24 ft³/s (0.007 m³/s) Oct. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.44	.45	2.7	3.9	3.2	13	21	20	10	3.1	14	8.7
2	.52	.39	2.5	3.8	3.1	12	21	20	16	2.9	4.4	9.1
3	.51	.37	2.4	3.7	3.0	11	22	20	15	2.7	4.2	8.8
4	.48	.38	2.2	3.6	2.9	9.7	23	18	14	2.7	2.9	8.5
5	.47	.39	2.2	3.5	2.8	8.8	23	17	14	3.5	3.0	8.2
6	.43	.37	2.0	3.6	2.7	8.9	23	7.8	15	3.6	3.0	7.8
7	.45	.37	2.1	3.6	2.7	8.4	23	.86	18	3.4	3.1	7.6
8	.45	.37	2.0	3.4	2.6	8.8	23	.88	27	3.2	3.1	12
9	.44	.43	2.0	3.3	2.5	8.8	24	.96	24	3.9	3.1	20
10	.41	.52	1.9	3.2	2.5	8.6	24	1.2	22	4.3	4.5	18
11	.37	.50	1.9	3.9	2.4	8.2	23	1.3	20	4.0	5.4	17
12	.36	.49	2.0	4.0	2.4	8.0	23	1.5	19	4.4	5.4	15
13	.33	.45	1.9	4.0	2.3	8.0	23	2.0	13	5.4	5.3	14
14	.33	.45	1.8	3.9	2.5	7.9	24	2.2	4.9	5.3	5.9	13
15	.32	.45	1.9	3.9	2.4	7.6	24	2.3	6.5	4.9	5.5	12
16	.27	.43	1.7	4.1	2.4	7.5	23	2.4	7.5	5.1	5.1	12
17	.28	.45	1.6	4.4	2.3	9.7	23	3.7	8.0	4.7	5.9	13
18	.31	.44	1.5	4.3	2.3	11	23	6.8	8.2	4.3	6.4	13
19	.28	.49	1.4	4.1	2.2	12	22	7.4	8.6	4.0	6.3	12
20	.24	.48	1.4	4.0	2.1	13	22	7.6	8.6	3.9	8.8	12
21	.25	.57	1.4	3.9	2.1	15	22	7.8	8.8	3.7	10	12
22	.32	.76	1.8	3.8	2.3	16	22	8.0	8.9	3.6	9.7	12
23	.34	.99	2.1	3.8	2.7	17	21	8.2	8.2	3.1	8.8	12
24	.31	1.0	3.6	3.9	3.7	18	21	8.6	7.5	2.8	8.3	11
25	.29	1.1	4.6	4.0	13	19	20	8.3	6.9	2.5	7.9	11
26	.29	2.6	4.5	3.9	17	19	20	7.6	6.3	2.3	7.5	10
27	.31	3.1	4.4	3.8	16	19	20	7.2	5.7	2.2	7.1	9.6
28	.26	3.4	4.3	3.7	15	19	21	6.9	4.9	13	6.7	9.2
29	.27	3.1	4.1	3.6	14	20	21	6.9	4.2	22	6.6	8.9
30	.27	2.9	4.1	3.5	---	21	21	7.6	3.3	20	6.4	8.7
31	.33	---	4.0	3.3	---	21	---	9.3	---	18	7.2	---
TOTAL	10.98	28.19	78.0	117.4	137.1	394.9	666	230.30	344.0	172.5	191.5	346.1
MEAN	.35	.94	2.52	3.79	4.73	12.7	22.2	7.43	11.5	5.56	6.18	11.5
MAX	.52	3.4	4.6	4.4	17	21	24	20	27	22	14	20
MIN	.24	.37	1.4	3.2	2.1	7.5	20	.86	3.3	2.2	2.9	7.6
CFSM	.02	.05	.14	.22	.27	.73	1.27	.43	.66	.32	.35	.66
IN.	.02	.06	.17	.25	.29	.84	1.42	.49	.73	.37	.41	.74

CAL YR 1979 TOTAL 1647.06 MEAN 4.51 MAX 18 MIN .24 CFSM .26 IN 3.50
WTR YR 1980 TOTAL 2716.97 MEAN 7.42 MAX 27 MIN .24 CFSM .42 IN 5.78

04099000 ST. JOSEPH RIVER AT MOTTVILLE, MI

LOCATION.--Lat 41°48'03", long 85°45'22", in SW¼ sec. 6, T.8 S., R.12 W., Michigan Meridian, St. Joseph County, Hydrologic Unit 04050001, on right bank 500 ft (152 m) upstream from bridge on U.S. Highway 12 at Mottville, 0.4 mi (0.6 km) downstream from Michigan Power Co. hydroelectric plant, 4 mi (6 km) upstream from Pigeon River, and at mile 96 (154 km).

DRAINAGE AREA.--1,866 mi² (4,833 km²).

PERIOD OF RECORD.--October 1923 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1930, 1932, 1938, 1940-42, 1945. WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.3 ft (230.22 m) Michigan Power Co. datum. Prior to Oct. 1, 1951, at site 0.4 mi (0.6 km) upstream at datum 4.2 ft (1.28 m) higher.

REMARKS.--Records good. Flow regulated by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--57 years, 1,550 ft³/s (43.90 m³/s), 11.28 in/yr (287 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 10,700 ft³/s (303 m³/s) Apr. 27, 1950, gage height, 10.76 ft (3.280 m), present datum; minimum daily, 39 ft³/s (1.10 m³/s) Oct. 19, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,660 ft³/s (160 m³/s) June 11, gage height, 7.17 ft (2.185 m); minimum, 78 ft³/s (2.21 m³/s) Oct. 31, gage height, 1.09 ft (0.332 m); minimum daily, 659 ft³/s (18.7 m³/s) Oct. 1, 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	659	1230	2090	2720	1550	1870	3200	2440	1850	1360	1510	2060
2	1110	1190	2030	2630	1470	1760	3210	2230	2280	1580	1450	2590
3	945	1350	1900	2620	1480	1640	3180	2100	2660	1350	1470	2620
4	962	1340	1870	2450	1480	1610	3190	2210	3050	1250	1590	3020
5	687	1280	1750	2390	1390	1590	3490	2180	3200	1410	1700	3410
6	1140	1220	1800	2120	1340	1590	3540	2100	3630	1920	1630	3000
7	904	1280	1800	1960	1370	1580	3680	2050	3820	1990	1780	2940
8	687	1160	1860	1840	1390	1560	3900	1840	5080	1830	1560	2840
9	1070	1310	1820	1690	1370	1560	3850	1770	5020	1970	1400	2380
10	1350	1240	1830	1670	1390	1580	3900	1730	5650	2590	1490	2560
11	1090	1120	1810	1840	1250	1580	4070	1680	5500	2020	1590	2370
12	715	1270	1790	1940	1180	1540	4030	1910	5330	2140	1610	2250
13	880	1150	1790	1970	1330	1500	3930	1790	5030	2130	1640	2060
14	1040	1000	1790	2030	1380	1540	3890	1710	4620	2120	1570	1990
15	780	1260	1740	2060	1390	1560	3790	1830	4420	2080	1720	1860
16	1190	970	1700	2010	1390	1540	3660	1550	3810	1960	1700	1830
17	880	1240	1690	2010	1300	1680	3650	1760	3640	2060	1900	1950
18	825	995	1620	2030	1140	2290	3460	2020	3410	1910	2290	2190
19	920	864	1520	2010	1350	3090	3360	1950	3350	1790	2130	2180
20	970	1080	1540	2000	1450	3590	3230	1980	3060	1750	2320	2030
21	818	1410	1510	2020	1340	3750	3140	2220	2880	1780	2520	2210
22	659	1510	1510	1980	1610	3750	2920	2330	2820	1530	2520	2240
23	1060	1240	1520	1910	1720	3780	2940	2250	2330	1350	2480	2160
24	1150	1120	1690	1770	1940	3820	2740	2190	2390	1410	2440	2210
25	1070	1460	1670	1740	2260	3760	2590	2130	2110	1310	2410	2090
26	970	1900	2560	1770	2140	3670	2540	2020	2030	1310	2320	1880
27	1160	2050	3010	1740	2140	3700	2510	1820	1880	1310	2330	1940
28	1160	2090	3450	1610	2120	3530	2430	1780	1780	1340	2110	1910
29	929	2160	3120	1520	2000	3510	2150	1770	1700	1310	1910	1880
30	962	2110	3050	1440	---	3500	2350	1640	1470	1250	1870	1920
31	958	---	2830	1490	---	3460	---	1790	---	1350	1690	---
TOTAL	29700	40599	61660	60980	44660	76480	98520	60770	99800	52460	58650	68570
MEAN	958	1353	1989	1967	1540	2467	3284	1960	3327	1692	1892	2286
MAX	1350	2160	3450	2720	2260	3820	4070	2440	5650	2590	2520	3410
MIN	659	864	1510	1440	1140	1500	2150	1550	1470	1250	1400	1830
CFSM	.51	.73	1.07	1.05	.83	1.32	1.76	1.05	1.78	.91	1.01	1.23
IN.	.59	.81	1.23	1.22	.89	1.52	1.96	1.21	1.99	1.05	1.17	1.37

CAL YR 1979 TOTAL 660283 MEAN 1809 MAX 5230 MIN 526 CFSM .97 IN 13.16
WTR YR 1980 TOTAL 752849 MEAN 2057 MAX 5650 MIN 659 CFSM 1.10 IN 15.01

04099750 PIGEON RIVER NEAR SCOTT, IN

LOCATION.--Lat 41°44'56", long 85°34'35", in SE¼ NW¼ sec.14, T.38 N., R.8 E., Lagrange County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from bridge on County Road 750 North, 1,200 ft (366 m) downstream from Page ditch, 0.7 mile (1.1 km) south of Indiana-Michigan State line, and 1.2 miles (1.9 km) northwest of Scott.

DRAINAGE AREA.--361 mi² (935 km²), of which 53.9 mi² (139.6 km²) does not contribute directly to surface runoff.

PERIOD OF RECORD.--June 1968 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 815.00 ft (248.412 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

AVERAGE DISCHARGE.--12 years, 333 ft³/s (9.431 m³/s), 12.53 in/yr (318 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,780 ft³/s (50.4 m³/s) Mar. 5, 1976, gage height, 7.07 ft (2.155 m); minimum daily, 42 ft³/s (1.19 m³/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 978 ft³/s (27.7 m³/s) Apr. 10, gage height, 5.32 ft (1.622 m); minimum daily, 114 ft³/s (3.23 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	114	156	310	501	233	312	764	442	378	205	244	471
2	133	193	307	487	231	302	740	431	556	209	243	480
3	141	170	299	470	228	295	738	421	597	196	251	401
4	133	157	296	442	225	288	825	409	524	185	245	352
5	125	151	296	424	222	282	950	396	476	189	230	333
6	126	145	304	398	219	274	923	378	481	200	221	310
7	149	148	313	380	217	267	864	361	505	197	211	295
8	152	147	306	360	217	271	855	346	570	191	201	294
9	139	149	290	365	215	284	899	337	623	191	193	293
10	134	174	278	350	215	305	966	325	577	204	211	287
11	133	179	273	340	210	363	949	322	539	200	263	278
12	126	169	277	330	207	358	910	322	521	202	266	270
13	126	162	282	325	200	352	868	326	505	209	248	267
14	130	159	273	320	197	352	845	329	489	214	252	261
15	127	157	262	310	194	355	857	316	475	202	252	252
16	126	189	256	305	190	384	855	168	464	213	238	247
17	128	145	248	328	186	461	807	273	438	225	248	308
18	128	132	235	335	182	578	755	371	404	209	266	358
19	125	155	230	320	178	606	718	405	377	201	265	308
20	123	159	228	310	175	613	684	383	360	198	309	282
21	122	162	228	303	250	664	650	377	336	190	408	275
22	126	183	237	298	370	727	612	379	311	191	409	273
23	152	218	275	293	420	771	549	378	293	192	359	287
24	166	245	342	285	390	786	514	378	282	177	334	288
25	142	237	475	280	370	838	505	368	272	168	324	276
26	140	293	535	270	356	879	488	349	260	163	314	264
27	136	326	514	261	335	841	467	329	246	170	301	256
28	134	325	457	254	330	807	462	312	235	200	285	247
29	130	321	480	250	322	801	471	299	227	277	274	242
30	130	313	509	248	---	800	456	293	215	265	266	237
31	130	---	506	238	---	787	---	327	---	247	272	---
TOTAL	4124	5819	10121	10380	7282	16003	21950	10850	12534	6280	8401	8990
MEAN	133	194	326	335	251	516	732	350	418	203	271	300
MAX	166	326	535	501	420	879	966	442	623	277	409	480
MIN	114	132	228	238	175	267	456	168	215	163	193	237
CFSM	.37	.54	.90	.93	.70	1.43	2.03	.97	1.16	.56	.75	.83
IN.	.42	.60	1.04	1.07	.75	1.65	2.26	1.12	1.29	.65	.87	.93

CAL YR 1979 TOTAL 108807 MEAN 298 MAX 1270 MIN 114 CFSM .83 IN 11.21
WTR YR 1980 TOTAL 122714 MEAN 335 MAX 966 MIN 114 CFSM .93 IN 12.65

04100222 NORTH BRANCH ELKHART RIVER AT COSPERVILLE, IN

LOCATION.--Lat 41°28'54", long 85°28'32", in NE¼ NW¼ sec.22, T.35 N., R.9 E., Noble County, Hydrologic Unit 04050001, on right bank at downstream side of bridge on County Road 900 North, 1,300 ft (396 m) downstream from Boyd ditch, 1.7 miles (2.7 km) upstream from Hustin ditch, and 3.1 miles (5.0 km) downstream from Waldron Lake.

DRAINAGE AREA.--142 mi² (368 km²).

PERIOD OF RECORD.--October 1971 to current year. October 1950 to September 1971 at site 3.1 miles (5.0 km) upstream, published as North Branch Elkhart River near Cosperville. Records may not be equivalent

GAGE.--Water-stage recorder. Datum of gage is 880.12 ft (268.261 m) National Geodetic Vertical Datum of 1929 (levels by State of Indiana, Department of Natural Resources).

REMARKS.--Records good except those for winter periods, which are fair. Flow regulated at times by dam at Waldron Lake.

AVERAGE DISCHARGE.--9 years, 125 ft³/s (3.540 m³/s), 11.95 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 682 ft³/s (19.3 m³/s) Apr. 7, 1978, gage height, 7.41 ft (2.258 m): minimum daily, 2.4 ft³/s (0.068 m³/s) Nov. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 348 ft³/s (9.86 m³/s) June 7, gage height, 6.38 ft (1.945 m): minimum daily, 38 ft³/s (1.08 m³/s) July 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	68	61	98	169	70	119	330	178	134	69	84	141
2	81	70	93	166	66	112	321	171	234	67	75	152
3	100	68	88	164	64	109	313	165	298	64	70	157
4	113	64	85	160	61	106	327	157	328	60	66	156
5	118	60	84	156	59	105	332	147	340	86	62	152
6	125	57	86	150	57	105	322	139	342	111	59	147
7	131	54	86	142	56	101	310	130	344	105	59	140
8	132	54	88	144	55	113	305	123	340	93	56	136
9	127	58	88	132	54	136	318	114	328	86	54	126
10	116	67	85	127	54	159	321	106	316	75	58	123
11	104	66	82	129	54	167	317	101	301	75	68	118
12	81	64	87	121	54	168	309	97	285	70	84	111
13	66	61	90	133	55	163	300	98	267	64	88	104
14	58	59	86	132	58	155	298	103	251	58	102	98
15	51	57	84	125	56	154	296	103	240	53	108	92
16	47	58	81	123	54	157	291	99	229	51	108	87
17	48	56	76	126	53	209	281	100	214	45	109	113
18	47	56	74	127	52	253	271	121	202	42	115	127
19	52	56	73	124	52	271	261	131	190	41	118	132
20	61	56	71	121	52	278	253	132	179	44	130	129
21	68	58	71	118	54	295	246	131	167	43	153	126
22	70	63	74	115	109	308	237	128	154	46	162	123
23	80	76	84	110	145	313	228	124	143	49	165	126
24	78	84	115	107	149	320	219	120	134	45	165	132
25	74	84	167	103	147	331	209	116	124	41	161	139
26	67	96	178	99	140	334	201	110	116	38	157	139
27	62	105	180	94	132	332	194	100	105	39	148	142
28	56	108	180	90	130	329	191	93	91	77	139	147
29	54	105	178	85	127	332	188	86	79	108	133	148
30	53	100	175	79	---	332	183	89	72	107	129	147
31	52	---	172	74	---	333	---	114	---	96	133	---
TOTAL	2440	2081	3259	3845	2269	6699	8172	3726	6547	2048	3318	3910
MEAN	78.7	69.4	105	124	78.2	216	272	120	218	66.1	107	130
MAX	132	108	180	169	149	334	332	178	344	111	165	157
MIN	47	54	71	74	52	101	183	86	72	38	54	87
CFSM	.55	.49	.74	.87	.55	1.52	1.92	.85	1.54	.47	.75	.92
IN.	.64	.55	.85	1.01	.59	1.75	2.14	.98	1.72	.54	.87	1.02

CAL YR 1979 TOTAL 36834 MEAN 101 MAX 417 MIN 11 CFSM .71 IN 9.65
WTR YR 1980 TOTAL 48314 MEAN 132 MAX 344 MIN 38 CFSM .93 IN 12.66

04100500 ELKHART RIVER AT GOSHEN, IN

LOCATION.--Lat 41°35'36", long 85°50'55", in NE¼ NE¼ sec.8, T.36 N., R.6 E., Elkhart County, Hydrologic Unit 04050001, on right bank 20 ft (6 m) downstream from River Avenue bridge at Goshen, 0.4 mile (0.6 km) upstream from Rock Run, and at mile 16.1 (25.9 km).

DRAINAGE AREA.--594 mi² (1,538 km²).

PERIOD OF RECORD.--April 1931 to current year.

REVISED RECORDS.--WSP 1337: 1939(M). WSP 1557: 1954. WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 769.43 ft (234.522 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 20, 1931, nonrecording gage at same site and datum.

REMARKS.--Records good except those for winter periods, which are fair.

AVERAGE DISCHARGE.--49 years, 502 ft³/s (14.22 m³/s), 11.48 in/yr (292 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,440 ft³/s (154 m³/s) Apr. 4, 1950, gage height, 10.15 ft (3.094 m); maximum gage height, 10.33 ft (3.149 m) July 10, 1951 and Mar. 5, 1979; minimum daily discharge, 7.0 ft³/s (0.20 m³/s) Aug. 11, 1964, result of extreme regulation.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 1,800 ft³/s (51.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 5	0300	*2390	67.7	*6.44	1.963	June 3	1100	1840	52.1	5.83	1.777
Apr. 10	0400	2000	56.6	5.77	1.759						

Minimum daily discharge, 157 ft³/s (4.45 m³/s) Oct. 31.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	214	185	462	660	271	445	1380	661	551	269	302	463
2	242	222	425	634	260	430	1300	642	1080	262	287	503
3	260	209	389	607	250	421	1350	623	1790	255	283	644
4	272	206	387	583	240	418	1950	603	1610	225	274	555
5	272	193	372	557	233	415	2210	585	1390	270	259	479
6	268	192	400	516	225	418	1760	567	1240	380	252	438
7	280	185	407	488	221	411	1500	550	1180	372	243	410
8	284	181	400	385	218	471	1420	536	1300	351	230	392
9	284	189	380	378	212	718	1700	520	1440	339	240	388
10	266	207	368	418	210	941	1930	501	1210	326	260	368
11	253	213	356	512	207	1010	1690	465	1020	308	277	345
12	249	208	363	481	205	846	1530	447	916	298	314	333
13	238	202	363	422	201	734	1430	473	833	283	314	326
14	214	194	361	483	230	666	1420	557	766	256	347	310
15	181	189	364	470	220	647	1650	498	728	235	413	298
16	187	183	351	461	210	748	1630	463	712	219	395	291
17	187	179	331	465	202	1070	1390	475	661	206	427	400
18	184	176	261	544	199	1680	1240	549	603	194	458	465
19	178	174	326	521	196	1590	1150	567	566	198	450	410
20	172	175	320	499	193	1350	1060	552	535	197	487	386
21	172	181	305	482	210	1360	1010	535	500	196	546	373
22	228	212	313	468	617	1500	948	517	472	205	528	372
23	221	270	357	455	1070	1380	891	502	439	210	488	383
24	214	332	630	321	890	1350	845	494	407	205	465	386
25	214	346	1270	364	686	1560	804	471	369	199	454	383
26	210	616	1340	361	537	1600	767	439	349	192	444	377
27	194	810	1010	345	490	1410	729	416	331	206	428	375
28	178	657	824	330	480	1310	721	393	315	246	385	370
29	166	579	746	317	465	1340	707	380	293	287	354	370
30	158	586	713	303	---	1440	679	382	278	307	357	366
31	157	---	688	288	---	1390	---	451	---	311	401	---
TOTAL	6799	8371	15542	14118	9848	31069	38791	15814	23884	8007	11362	11959
MEAN	219	279	504	455	340	1002	1293	510	796	258	367	399
MAX	284	810	1340	660	1070	1680	2210	661	1790	380	546	644
MIN	157	174	261	288	193	411	679	380	278	192	230	291
CFSM	.37	.47	.85	.77	.57	1.69	2.18	.86	1.34	.43	.62	.67
IN.	.43	.52	.98	.88	.62	1.95	2.43	.99	1.50	.50	.71	.75

CAL YR 1979 TOTAL 168252 MEAN 461 MAX 4470 MIN 124 CFSM .78 IN 10.54
WTR YR 1980 TOTAL 195654 MEAN 535 MAX 2210 MIN 157 CFSM .90 IN 12.25

04101000 ST. JOSEPH RIVER AT ELKHART, IN

LOCATION.--Lat 41°41'30", long 85°58'30", in SW¼ NE¼ sec.5, T.37 N., R.5 E., Elkhart County, Hydrologic Unit 04050001, on left bank 200 ft (61 m) downstream from mouth of Elkhart River, 200 ft (61 m) upstream from Main Street bridge in Elkhart, 2,000 ft (610 m) downstream from Christiana Creek, 0.5 mile (0.8 km) downstream from Elkhart Hydroelectric Plant, and at mile 76.5 (123.1 km).

DRAINAGE AREA.--3,370 mi² (8,728 km²).

PERIOD OF RECORD.--August 1947 to current year. Gage heights at site 0.8 mile (1.3 km) downstream at different datum from September 1924 to March 1926 are available in the district office.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 700.00 ft (213.360 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. The flow is regulated by Elkhart Hydroelectric Plant.

AVERAGE DISCHARGE.--33 years, 3,092 ft³/s (87.57 m³/s), 12.46 in/yr (316 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 18,400 ft³/s (521 m³/s) Apr. 5, 1950, gage height, 27.82 ft (8.480 m); minimum daily, 336 ft³/s (9.52 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge 10,100 ft³/s (286 m³/s) June 10, gage height, 23.62 ft (7.199 m); minimum daily, 1,220 ft³/s (34.6 m³/s) Oct. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1250	1920	3760	4810	2620	3290	6560	4480	3520	2290	2430	3700
2	2200	2210	3630	4670	2660	3220	6380	4270	4720	2720	2280	4410
3	2310	2230	3420	4580	2620	2930	6340	4010	5710	2410	2410	4510
4	1670	2200	3240	4410	2430	2970	7100	4060	6390	2170	2480	4630
5	1350	1950	3260	4180	2590	3090	7840	4040	5980	2400	2500	5070
6	1910	2180	3240	3900	2490	2950	7350	3860	6230	2860	2620	4540
7	1960	1930	3340	3390	2360	2920	7210	3720	6340	3040	2410	4360
8	1360	2150	3350	3120	2390	2940	7290	3540	7520	2920	2460	4210
9	1720	2030	3340	3090	2430	3210	7750	3350	7830	2950	2140	3830
10	2200	2260	3260	3050	2350	3630	8040	3290	8280	3470	2380	3770
11	1290	1960	3240	3750	2250	3880	7930	3140	8220	3170	2610	3730
12	1620	1970	3240	3560	2100	3610	7790	3390	7860	3050	2610	3420
13	1420	2240	3200	3600	2150	3370	7520	3310	7530	3070	2710	3180
14	1760	1780	3240	3630	2360	3340	7460	3270	6920	3040	2650	3080
15	1400	2180	3130	3590	2370	3290	7690	3290	6900	3000	2790	3010
16	1610	1710	3050	3540	2330	3500	7520	3140	6280	2860	2770	2940
17	1890	2190	3390	3620	2180	4090	7150	3040	5710	2830	3120	3390
18	1220	1840	2960	3700	2000	4930	6860	3580	5600	2850	3520	3660
19	1640	1580	2760	3700	2220	6150	6490	3700	5260	2590	3430	3540
20	1700	1860	2820	3590	2570	6530	6230	3680	4970	2570	3750	3470
21	1320	2190	2700	3590	2320	6850	5910	3830	4520	2570	4070	3360
22	1410	2690	2720	3460	3370	7000	5690	3940	4360	2400	3990	3500
23	1550	2410	2910	3390	4370	6990	5460	3800	3880	2140	3990	3430
24	1870	2320	3610	3090	4200	6990	5250	3710	3700	2140	3840	3440
25	1930	2670	4600	3030	4190	7340	4990	3650	3430	2020	3760	3300
26	1780	3910	5370	3170	3860	7270	4860	3450	3170	1930	3590	3240
27	1960	4330	5500	2960	3810	7100	4760	3230	3070	2040	3620	2970
28	1930	4190	5710	3020	3830	6830	4640	3100	2920	2170	3330	3080
29	1620	4040	5450	2630	3540	6850	4330	3070	2770	2200	3070	2970
30	1680	3940	5160	2630	---	6870	4360	2990	2560	2190	2920	3050
31	1650	---	5010	2720	---	6810	---	3290	---	2290	2960	---
TOTAL	52180	73060	113710	109170	80960	150840	194750	110220	162150	80350	93210	108790
MEAN	1683	2435	3668	3522	2792	4866	6492	3555	5405	2592	3007	3626
MAX	2310	4330	5710	4810	4370	7390	8040	4480	8280	3470	4070	5070
MIN	1220	1580	2700	2630	2000	2920	4330	2990	2560	1930	2140	2940
CFSM	.50	.72	1.09	1.05	.83	1.44	1.93	1.06	1.60	.77	.89	1.08
IN.	.58	.81	1.26	1.21	.89	1.67	2.15	1.22	1.79	.89	1.03	1.20

CAL YR 1979 TOTAL 1171830 MEAN 3210 MAX 11400 MIN 1090 CFSM .95 IN 12.94
WTR YR 1980 TOTAL 1329390 MEAN 3632 MAX 8280 MIN 1220 CFSM 1.08 IN 14.67

04101500 ST. JOSEPH RIVER AT NILES, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°49'45", long 86°15'35", in SW¼ sec. 26, T.7 S., R.17 W., Berrien County, Hydrologic Unit 04050001, on right bank 100 ft (30 m) upstream from Main Street Bridge at Niles, 0.6 mi (1.0 km) downstream from dam at French Paper Co., 1 mi (2 km) upstream from Dowagiac River, and at mile 44 (71 km).

DRAINAGE AREA.--3,666 mi^2 (9,495 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1933-36, 1940-43, 1945-46(M). WSP 1911: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 633.02 ft (192.944 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1968, at datum 2.00 ft (0.610 m) higher. Oct. 1, 1930 to Feb. 11, 1931, nonrecording gage on Main Street Bridge, and Feb. 12 to June 30, 1931, nonrecording gage 50 ft (15 m) upstream from present site (gage heights referred to NGVD). Since Apr. 13, 1970, auxiliary water-stage recorder at sewage-treatment plant, 1.1 mi (1.8 km) downstream from base gage at same datum. Oct. 1, 1943 to Apr. 12, 1970, auxiliary gage was headwater gage at hydroelectric plant at Buchanan Dam, 8 mi (13 km) downstream from base gage at different datum.

REMARKS.--Water-discharge records good. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--50 years, 3,184 ft^3/s (90.17 m^3/s), 11.79 in/yr (299 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 20,200 ft^3/s (572 m^3/s) Apr. 5, 1950, gage height, 15.10 ft (4.602 m), present datum; minimum daily, 420 ft^3/s (11.9 m^3/s) Aug. 30, 1931.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 8,950 ft^3/s (253 m^3/s) Apr. 10, gage height, 9.38 ft (2.859 m); minimum daily, 994 ft^3/s (28.15 m^3/s) Oct. 23.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1590	2160	4050	5170	2890	3540	6920	4930	3690	2070	2480	4120
2	2520	2420	3860	4720	2820	3350	6470	4610	5330	2730	2900	4780
3	3070	2240	3680	4790	2950	3640	6920	4290	5900	2710	2540	4870
4	1900	2440	3590	4610	2530	3380	7280	4180	6760	2470	2640	4760
5	2100	2380	3330	4650	2910	3250	8230	4240	6320	2580	2620	5340
6	1890	2510	3540	4150	2580	3220	7980	4200	6560	2690	2810	4990
7	2420	2090	3550	3640	2750	3080	7390	4040	6590	3360	2700	4550
8	2050	2340	3770	3090	2550	3180	7680	3860	7480	3140	2940	4590
9	1800	2270	3590	3840	2790	3480	8630	3090	8420	3090	2400	4330
10	2330	2430	3320	3240	2590	4040	8900	3480	8300	3470	2750	3910
11	1820	2060	3470	3840	2520	4310	8710	3370	8370	3780	2740	4030
12	2050	2420	3430	3570	2370	4220	8330	3530	8180	2940	2920	3960
13	1900	2430	3510	3900	2330	3600	8010	3610	7750	3200	3050	3690
14	3470	2070	3460	3980	2670	3500	7800	3580	7240	3330	3320	3550
15	2920	2370	3270	3920	2680	3690	8290	3220	6840	2970	3030	2830
16	1970	2060	3240	3640	2560	3780	8360	3790	6800	3300	3060	3440
17	2400	2030	3390	3870	2470	4590	7470	3050	5720	2820	3660	3780
18	1650	2290	3260	4030	2280	5870	7290	3690	5830	3140	3360	4000
19	1950	1980	3140	3710	2330	6360	6860	4020	5360	2890	4020	4000
20	1940	1910	3040	3880	2990	6900	6630	3820	5440	2760	4000	3940
21	1890	2370	3020	3800	2500	6980	6130	3920	5370	2710	4410	3520
22	1270	2910	3030	3770	3530	7470	6220	4030	4560	2810	4380	3910
23	994	2600	2980	3680	5180	7380	5450	4210	4650	2380	4070	3820
24	1090	2680	3850	3180	4640	7310	5800	3960	3980	2380	4200	3540
25	1770	2800	5440	3480	4590	7890	4940	3810	3890	2210	4000	3890
26	2040	4350	5830	3050	4510	7530	5090	3890	3370	2370	4240	3530
27	1990	4980	6020	3330	4080	7690	5030	3280	3590	2370	3450	3010
28	2070	4590	5940	3050	4030	7000	5000	3350	2430	2230	3770	3480
29	2240	4350	5770	2960	4090	7140	4840	3310	3050	2580	3310	3220
30	1930	4190	5570	2800	---	7510	4270	3370	2780	2230	3200	3240
31	1870	---	4940	2840	---	7100	---	3470	---	2570	3380	---
TOTAL	62894	80720	121880	116180	89710	161980	206920	117200	170550	86280	102350	118620
MEAN	2029	2691	3932	3748	3093	5225	6897	3781	5685	2783	3302	3954
MAX	3470	4980	6020	5170	5160	7890	8900	4930	8420	3780	4410	5340
MIN	994	1910	2980	2800	2280	3080	4270	3050	2430	2070	2400	2830
CFSM	.55	.73	1.07	1.02	.84	1.43	1.88	1.03	1.55	.76	.90	1.08
IN.	.64	.82	1.24	1.18	.91	1.64	2.10	1.19	1.73	.88	1.04	1.20

CAL YR 1979 TOTAL 1315744 MEAN 3605 MAX 13700 MIN 994 CFSM .98 IN 13.35
WTR YR 1980 TOTAL 1435284 MEAN 3922 MAX 8900 MIN 994 CFSM 1.07 IN 14.56

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER QUALITY RECORDS

PERIOD OF RECORD.--Water years 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURE: February 1979 to current year.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements at 1700 hours by a local observer. Biological Data (Phytoplankton) is for the 1979-80 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded (water years 1979, 1980), 619 micromhos Feb. 5, 6, 1980; minimum daily, 310 micromhos, Mar. 4, 1979.
WATER TEMPERATURES: Maximum daily recorded, 29.0°C July 20, 21, 1980; minimum daily recorded, 0.0°C on several days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)
OCT 12...	1115	1910	530	8.2	11.0	10.2	95	--	K89	250	47	68
NOV 21...	1030	2770	575	8.0	8.0	11.0	94	340	140	260	34	71
DEC 28...	1030	5940	516	7.7	3.5	13.2	98	1000	6400	230	63	66
JAN 30...	1015	2760	585	8.1	.5	14.6	101	850	460	270	61	75
MAR 05...	1100	3670	560	8.0	1.5	--	--	1600	1200	260	57	72
APR 07...	1530	6700	500	7.9	9.5	11.2	100	660	1200	240	68	68
MAY 22...	1215	3680	535	7.8	18.0	10.1	107	K600	K160	250	45	68
JUN 25...	1330	3450	510	7.8	23.0	9.2	112	--	K25	250	47	73
JUL 30...	1400	2130	458	8.1	23.0	7.6	90	--	--	260	52	72
AUG 27...	1030	1680	466	7.9	25.0	8.2	99	K800	77	250	51	69
SEP 30...	1300	3210	521	8.1	17.0	--	--	510	K110	260	47	70

DATE	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM ADSORPTION RATIO	SODIUM PERCENT	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
OCT 12...	20	0	13	.4	14	1.8	250	0	205	2.5	43
NOV 21...	19	0	11	.3	12	1.8	270	0	221	4.3	47
DEC 28...	17	--	8.5	.2	10	2.8	210	0	172	6.7	48
JAN 30...	21	0	13	.3	13	1.8	260	0	213	3.3	48
MAR 05...	20	0	13	.4	10	2.0	250	0	205	4.0	53
APR 07...	17	--	8.0	.2	7	2.4	210	0	172	4.2	45
MAY 22...	20	0	11	.3	9	1.6	250	0	205	6.3	48
JUN 25...	17	0	9.6	.3	8	2.0	250	0	210	6.2	42
JUL 30...	20	--	12	.3	9	1.9	270	0	210	3.3	32
AUG 27...	19	0	9.1	.3	7	2.0	250	0	200	4.9	42
SEP 30...	20	0	10	.3	8	2.1	270	0	210	3.3	31

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
12...	25	.2	6.1	321	305	1660	1.1	1.0	.330	.280	.40
NOV											
21...	23	.2	6.6	338	318	2530	1.7	1.3	.300	.270	.36
DEC											
28...	19	.2	7.2	323	304	5180	7.2	7.2	.200	.200	.26
JAN											
30...	24	.2	7.4	346	326	2580	1.8	1.7	.410	.340	.50
MAR											
05...	27	.2	6.9	355	326	3520	2.0	2.0	.500	.490	.63
APR											
07...	17	.1	6.3	305	277	5520	2.4	2.3	.190	.170	.23
MAY											
22...	20	.2	3.6	340	301	3380	1.3	1.2	.280	.250	.34
JUN											
25...	19	.2	5.1	330	297	3070	1.2	1.2	.120	.060	.15
JUL											
30...	22	.2	6.0	380	296	2190	1.1	.78	.150	.150	.19
AUG											
27...	20	.4	9.6	305	295	1380	.90	.89	.190	.130	.23
SEP											
30...	21	.2	8.9	330	294	2860	.96	.95	.180	.130	.22

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
12...	.48	.81	1.9	8.5	.070	.21	.020	--	11	57	100
NOV											
21...	.66	.96	2.7	12	.050	.15	.040	4.4	6	45	100
DEC											
28...	1.3	1.5	8.7	39	.070	.21	.030	7.0	14	225	100
JAN											
30...	.45	.86	2.7	12	.040	.12	.010	--	6	45	100
MAR											
05...	.42	.92	2.9	13	.040	.12	.020	6.4	5	50	100
APR											
07...	.47	.66	3.1	14	.140	.43	.020	6.7	25	452	100
MAY											
22...	.72	1.0	2.3	10	.080	.25	.010	7.7	21	209	100
JUN											
25...	.75	.87	2.1	9.2	.060	.18	.010	--	18	168	100
JUL											
30...	.95	1.1	2.2	9.7	.120	.37	.010	11	16	92	100
AUG											
27...	.37	.56	1.5	6.5	.090	.28	.020	20	14	64	100
SEP											
30...	.61	.79	1.8	7.7	.060	.18	.010	--	12	104	100

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT 12...	1115	2	1	100	70	--	3	--	<10	0
JAN 30...	1015	3	2	200	70	0	0	20	10	0
JUN 25...	1330	--	6	<50	70	--	5	<10	10	0
SEP 30...	1300	2	2	100	100	0	0	10	10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT 12...	0	7	4	320	10	2	1	60	7	.2
JAN 30...	0	6	2	210	10	1	0	40	30	.2
JUN 25...	0	8	3	470	10	0	0	80	0	.1
SEP 30...	0	4	3	350	20	1	0	70	10	<.1

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT 12...	.5	8	7	0	0	--	--	0	4.8	1.5
JAN 30...	<.1	3	1	0	0	0	20	20	4.5	.7
JUN 25...	.1	4	0	0	0	0	20	0	8.0	2.1
SEP 30...	<.1	7	2	0	0	0	20	10	4.9	1.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV 21...	1030	40	63.9	5.20	6.14	14.7	.000
MAR 05...	1100	35	141	2.60	3.86	8.96	.280
JUN 25...	1330	34	1027	14.0	19.4	5.26	1.01
AUG 27...	1030	28	287	26.5	35.0	32.4	9.41

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 5,79	MAY 23,79	JUN 27,79	AUG 1,79	SEP 6,79	NOV 21,79
TIME	1630	1030	1000	1000	1030	1030
TOTAL CELLS/ML	30000	18000	26000	67000	540000	11000
DIVERSITY: DIVISION	1.1	1.5	1.5	1.6	0.7	1.3
.CLASS	1.1	1.5	1.5	1.6	0.7	1.6
..ORDER	2.0	1.9	1.8	2.3	1.5	2.2
...FAMILY	2.1	2.1	2.6	2.6	1.6	2.4
....GENUS	3.0	2.6	3.4	3.1	2.0	3.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	300	1	*	0	--	-	--	-
...CHLOROCOCCACEAE												
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	*	0	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	310	1	--	-	150	1	1200	2	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	270	1	450	2	--	-	*	0	*	0	--	-
....MICRACTINIUM	--	-	--	-	1800	7	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	300	2	--	-	440	1	*	0	150	1
....CHLORELLA	--	-	--	-	--	-	--	-	10000	2	*	0
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	*	0
....CLOSTERIOPSIS	--	-	--	-	150	1	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	4500*	18	1800	3	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	8900	2	--	-
....OOCYSTIS	--	-	--	-	300	1	--	-	--	-	--	-
....SELENASTRUM	--	-	150	1	980	4	2400	4	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	*	0	--	-	*	0	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	600	3	--	-	--	-	3200	1	--	-
....CRUCIGENIA	--	-	--	-	--	-	740	1	--	-	--	-
....SCENEDESMUS	700	2	300	2	2900	11	6500	10	8100	1	780	7
....TETRASTRUM	--	-	--	-	1800	7	--	-	3200	1	190	2
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	150	1	--	-	1200	2	--	-	97	1
...VOLVOCACEAE												
....PANDORINA	--	-	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	*	0	3900*	21	3100	12	2100	3	3700	1	3100*	28
....MELOSIRA	6100*	21	380	2	4400*	17	19000*	28	21000	4	1200	11
....STEPHANODISCUS	--	-	2300	12	--	-	440	1	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	*	0	--	-
...CYMBELLACEAE												
....CYMBELLA	160	1	--	-	--	-	--	-	--	-	*	0
...DIATOMACEAE												
....DIATOMA	160	1	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	*	0	--	-	--	-	--	-	1100	10
....FRAGILARIA	190	1	1500	8	830	3	--	-	--	-	190	2
....SYNEDRA	230	1	--	-	--	-	1200	2	*	0	630	6
...GOMPHONEMATACEAE												
....GOMPHONEMA	390	1	--	-	--	-	--	-	--	-	*	0
...NAVICULACEAE												
....NAVICULA	470	2	--	-	--	-	*	0	--	-	97	1
...NITZSCHIACEAE												
....NITZSCHIA	--	-	--	-	150	1	740	1	--	-	*	0
...SURIRELLACEAE												
....SURIRELLA	*	0	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....DINOBRYON	--	-	--	-	--	-	--	-	--	-	630	6
.XANTHOPHYCEAE												
..HETEROCOCCALES												
...CHLOROTHECIACEAE												
....OPHIOCYTIUM	*	0	--	-	--	-	--	-	--	-	--	-

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 5,79		MAY 23,79		JUN 27,79		AUG 1,79		SEP 6,79		NOV 21,79	
TIME	1630		1030		1000		1000		1030		1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	*	0	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	300	2	*	0	740	1	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	620	2	--	-	--	-	9500	14	--	-	--	-
....ANACYSTIS	5800#	20	300	2	1300	13	3400	5	320000#	58	--	-
....COCCOCHLORIS	5800#	20	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....ARTHROSPIRA	540	2	--	-	--	-	--	-	--	-	--	-
....LYNGBYA	2700	9	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	4900#	17	7600#	41	910	9	15000#	22	120000#	21	1300	11
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	47000	9	1400	12
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	*	0	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	--	-	--	-	*	0
....PHACUS	--	-	--	-	--	-	--	-	*	0	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	APR 7,80 1530	MAY 22,80 1215	JUN 25,80 1330	JUL 30,80 1400	AUG 27,80 1030	SEP 30,80 1300
TOTAL CELLS/ML	10000	27000	73000	73000	44000	45000
DIVERSITY: DIVISION	1.6	1.4	1.5	1.5	1.2	1.4
.CLASS	1.7	1.4	1.5	1.5	1.2	1.4
..ORDER	2.1	2.1	1.8	1.8	1.6	2.2
...FAMILY	2.7	2.5	2.3	1.9	2.6	2.7
....GENUS	3.2	3.1	2.8	2.4	3.4	3.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	*	0	--	-	--	-	--	-
...CHLOROCOCCACEAE												
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	3600	5	--	-	6200	14	3600	8
...HYDRODICTYACEAE												
....PEDIASTRUM	600	6	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	3800	14	--	-	--	-	1700	4	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	*	0	600	1	480	1	520	1	*	0
....CHLORELLA	150	1	--	-	900	1	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-	*	0
....DICTYOSPHAERIUM	--	-	--	-	1200	2	--	-	2400	5	2500	6
....KIRCHNERIELLA	75	1	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	2100	3	--	-	1500	4	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-	*	0
....TETRAEDRON	--	-	--	-	*	0	480	1	*	0	--	-
....TREUBARIA	--	-	--	-	--	-	*	0	--	-	*	0
...SCENEDESMACEAE												
....ACTINASTRUM	300	3	--	-	2400	3	--	-	1400	3	800	2
....CRUCIGENIA	--	-	--	-	--	-	2600	4	--	-	--	-
....SCENEDESMUS	1000	10	1100	4	4800	7	5300	7	9300*	21	4300	10
....TETRASTRUM	--	-	--	-	--	-	960	1	2100	5	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	75	1	270	1	2400	3	960	1	1200	3	1100	2
...VOLVOCACEAE												
....PANDORINA	--	-	--	-	4800	7	--	-	--	-	--	-
..ZYGNEMATALES												
...DESMIDIACEAE												
....STAURASTRUM	--	-	--	-	*	0	--	-	*	0	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	3500*	35	7000*	26	30000*	42	8600	12	7700*	18	2000	4
....MELOSIRA	1200	12	5400*	20	3900	5	18000*	24	5500	13	2900	6
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....CYMBELLA	75	1	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	75	1	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	150	1	940	3	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	1100	4	--	-	--	-	--	-	500	1
....SYNEDRA	300	3	2300	8	--	-	--	-	*	0	*	0
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	450	4	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	220	2	1100	4	--	-	480	1	1000	2	*	0
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....DINOBRYON	75	1	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE												
..HETEROCOCCALES												
...CHLOROTHECIACEAE												
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-	--	-

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04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	APR 7,80		MAY 22,80		JUN 25,80		JUL 30,80		AUG 27,80		SEP 30,80	
TIME	1530		1215		1330		1400		1030		1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-	500	1
...CRYPTOMONADACEAE												
....CRYPTOMONAS	75	1	1200	4	--	-	--	-	*	0	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	1200	4	14000#	20	31000#	42	2800	6	15000#	33
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	900	2
...OSCILLATORIACEAE												
....ARTHROSPIRA	--	-	--	-	--	-	--	-	--	-	--	-
....LYNGBYA	--	-	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	600	6	1600	6	--	-	4300	6	--	-	10000#	22
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE												
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	75	1	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	1300	13	--	-	--	-	*	0	--	-	*	0

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04101500 ST. JOSEPH RIVER AT NILES, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	573		568	525	574	500			499	---		498
2	576		568	541	567	493			497	---		508
3	573		568	553	580	489			497	---		500
4	573		565	503	615	492			497	---		500
5	572		565	539	619	492			529	---		494
6	563		568	558	619	492			499	---		498
7	563		578	538	617	492			499	542		502
8	565		564	580	607	492			528	540		512
9	571		562	578	610	492			500	524		503
10	571		562	586	614	492			532	541		508
11	573		575	607	598	492			529	543		499
12	565		575	502	605	487			529	518		502
13	563		566	506	538	494			530	545		502
14	572		570	565	538	493			530	545		512
15	575		563	510	540	493			501	458		512
16	563		581	569	539	490			---	463		500
17	563		586	569	539	492			---	---		500
18	563		584	555	539	492			---	508		496
19	565		578	557	576	492			---	550		466
20	558		582	567	537	492			---	517		519
21	553		568	---	537	491			---	547		483
22	564		587	---	577	491			---	544		463
23	---		536	---	542	493			---	497		---
24	574		568	---	580	493			---	546		---
25	575		548	---	576	493			530	544		---
26	573		566	---	576	493			---	540		---
27	585		577	---	554	492			---	547		---
28	555		---	---	560	---			---	546		---
29	583		---	---	577	---			---	546		---
30	582		---	---	---	---			---	---		---
31	584		---	---	---	---			---	---		---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---		3.0	4.0	.0	1.0			18.0	---		24.5
2	---		3.0	4.5	.0	.5			18.5	---		25.0
3	---		2.5	3.5	.0	1.0			18.5	---		25.0
4	---		2.0	2.0	.0	1.5			18.5	---		24.5
5	---		3.0	1.5	.0	2.0			19.0	---		24.0
6	---		3.0	1.5	.0	1.0			19.0	---		24.0
7	---		4.0	.5	.0	2.0			18.5	27.0		24.5
8	---		3.5	.5	.0	2.5			19.0	26.5		23.5
9	---		4.0	.0	.0	1.5			19.0	27.0		23.0
10	---		4.0	.5	.0	1.5			18.5	27.5		23.5
11	---		3.5	2.0	.0	2.0			19.0	26.5		23.5
12	---		3.5	1.5	.0	2.5			19.0	26.0		23.0
13	---		4.0	2.0	.0	2.0			19.0	27.5		24.0
14	---		4.5	1.0	.0	2.0			19.5	28.5		23.5
15	---		4.0	1.5	.0	1.5			20.0	28.0		23.0
16	---		4.0	2.0	1.0	1.5			19.5	28.5		23.5
17	---		2.5	3.0	1.5	2.0			20.0	---		23.5
18	---		2.5	2.0	1.0	2.0			20.0	28.5		23.0
19	---		1.0	2.5	1.0	2.5			20.0	26.5		23.0
20	---		1.0	2.5	.5	2.0			19.5	29.0		24.0
21	---		3.0	---	.0	2.5			19.5	29.0		23.5
22	---		4.0	---	.5	2.5			19.5	28.0		24.0
23	---		4.0	---	.0	2.5			20.0	27.5		---
24	12.0		4.5	---	.0	2.0			20.0	26.5		---
25	12.0		6.0	---	.0	2.0			20.5	26.5		---
26	11.5		4.5	---	1.0	1.5			---	27.0		---
27	11.0		5.0	---	.5	2.5			---	26.0		---
28	11.0		---	---	1.0	---			---	25.0		---
29	11.5		---	---	1.5	---			---	25.0		---
30	11.5		---	---	---	---			---	---		---
31	11.0		---	---	---	---			---	---		---

04101800 DOWAGIAC RIVER AT SUMNERVILLE, MI

LOCATION.--Lat 41°54'57", long 86°12'47", in SE¼ sec.30, T.6 S., R.16 W., Cass County, Hydrologic Unit 04050001, on right bank 30 ft (9 m) upstream from bridge on Indian Lake Road, 0.3 mi (0.5 km) west of Sumnerville.

DRAINAGE AREA.--255 mi² (660 km²).

PERIOD OF RECORD.--October 1960 to current year.

GAGE.--Water-stage recorder. Datum of gage is 692.62 ft (211.111 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by millpond and lake-level control dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 280 ft³/s (7.930 m³/s), 14.91 in/yr (379 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft³/s (36.2 m³/s) June 26, 1968, gage height, 8.78 ft (2.676 m); minimum, 86 ft³/s (2.44 m³/s) Sept. 10, 1964; minimum gage height, 2.57 ft (0.783 m) Aug. 8, 9, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 811 ft³/s (23.0 m³/s) June 8, gage height, 6.68 ft (2.036 m); minimum, 174 ft³/s (4.93 m³/s) Oct. 1, gage height, 3.39 ft (1.033 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	309	421	368	267	303	385	352	341	235	230	283
2	232	328	397	358	272	291	392	340	406	233	224	342
3	223	306	376	351	268	287	401	328	616	225	258	350
4	226	292	365	341	262	289	458	313	519	214	246	314
5	245	282	378	329	267	291	430	302	426	281	229	287
6	238	278	445	316	267	284	395	290	462	378	225	268
7	337	273	444	310	260	281	380	281	496	334	221	252
8	335	272	469	301	259	285	436	275	795	310	212	243
9	299	279	425	300	263	293	658	271	741	305	200	244
10	312	298	397	297	259	296	694	269	572	310	220	249
11	308	289	385	341	259	296	613	285	472	282	247	236
12	317	280	418	348	258	285	550	284	425	272	252	233
13	313	274	407	333	253	282	497	316	392	260	234	246
14	296	270	374	324	258	281	484	310	371	246	355	245
15	280	266	353	316	259	285	533	294	374	231	330	243
16	271	264	342	323	263	329	500	285	391	236	289	242
17	267	260	332	411	261	611	453	290	356	259	332	396
18	262	257	322	403	253	660	427	356	339	247	380	398
19	255	255	320	374	267	579	408	339	327	243	330	343
20	256	253	312	351	270	537	392	319	326	239	420	324
21	259	306	307	331	292	527	379	301	309	228	450	318
22	260	383	333	321	436	484	369	287	296	225	363	297
23	323	420	379	312	522	440	355	275	284	209	320	323
24	348	393	463	302	484	431	348	273	276	194	292	299
25	332	362	630	311	431	446	348	279	266	187	275	281
26	314	586	592	297	376	416	340	267	257	184	260	267
27	300	577	500	290	356	395	332	254	251	257	247	258
28	290	528	445	291	338	383	350	246	249	275	235	251
29	280	480	415	284	319	419	364	265	244	253	226	244
30	273	445	395	282	---	415	363	286	237	239	220	235
31	267	---	380	274	---	397	---	331	---	240	223	---
TOTAL	8694	10065	12521	10090	8799	11798	13034	9163	11816	7831	8545	8511
MEAN	280	336	404	325	303	381	434	296	394	253	276	284
MAX	348	586	630	411	522	660	694	356	795	378	450	398
MIN	176	253	307	274	253	281	332	246	237	184	200	233
CFSM	1.10	1.32	1.58	1.28	1.19	1.49	1.70	1.16	1.55	.99	1.08	1.11
IN.	1.27	1.47	1.83	1.47	1.28	1.72	1.90	1.34	1.72	1.14	1.25	1.24

CAL YR 1979 TOTAL 127649 MEAN 350 MAX 1050 MIN 171 CFSM 1.37 IN 18.62
WTR YR 1980 TOTAL 120867 MEAN 330 MAX 795 MIN 176 CFSM 1.29 IN 17.63

04102500 PAW PAW RIVER AT RIVERSIDE, MI

LOCATION.--Lat 42°11'10", long 86°22'06", in SW¼ SE¼ sec.23, T.3 S., R.18 W., Berrien County, Hydrologic Unit 04050001, on left bank 40 ft (12 m) upstream from bridge on Coloma Road, 0.8 mi (1.3 km) east of Riverside.

DRAINAGE AREA.--390 mi² (1,010 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 1337: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 588.80 ft (179.466 m) National Geodetic Vertical Datum of 1929. May 10, 1966, to July 11, 1967, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation, principally during low flow, caused by paper mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 437 ft³/s (12.38 m³/s), 15.22 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,830 ft³/s (80.1 m³/s) Mar. 9, 1979, gage height, 10.11 ft (3.082 m); minimum, 99 ft³/s (2.80 m³/s) July 5, 1964, gage height, 2.66 ft (0.811 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,170 ft³/s (33.1 m³/s) Apr. 14, gage height, 8.33 ft (2.539 m); minimum, 290 ft³/s (8.21 m³/s) Oct. 1, gage height, 4.44 ft (1.353 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	293	447	844	975	450	660	691	545	419	362	387	473
2	316	457	882	896	450	620	699	539	453	348	384	503
3	322	455	912	821	440	593	690	536	520	340	442	511
4	325	442	850	757	430	575	699	532	626	336	497	494
5	335	431	803	697	420	533	715	521	658	390	508	480
6	344	428	781	645	420	499	700	504	663	547	513	478
7	386	427	781	614	410	476	684	483	706	607	522	480
8	402	417	761	580	410	478	701	462	751	573	540	460
9	405	399	753	580	410	473	949	445	866	538	538	437
10	427	390	730	600	421	462	1090	432	824	505	506	394
11	431	379	725	570	419	464	1030	430	857	460	466	390
12	419	372	746	552	414	461	1010	429	987	418	446	391
13	414	367	764	539	406	456	1110	444	1050	400	427	397
14	421	365	752	530	405	449	1150	459	1028	389	466	395
15	440	361	718	530	402	445	1160	457	925	387	533	389
16	456	357	687	539	404	463	1100	456	817	398	566	390
17	472	352	664	562	403	518	1020	453	767	412	578	469
18	482	354	662	580	399	613	943	470	731	421	599	546
19	475	355	612	583	403	662	893	494	711	415	633	560
20	460	355	588	585	402	651	848	501	715	420	660	535
21	438	382	564	588	418	670	804	501	712	418	694	525
22	426	440	548	594	475	711	749	501	679	415	697	527
23	432	492	561	594	576	741	694	489	621	399	678	530
24	437	523	614	550	671	751	645	449	567	405	669	519
25	446	529	781	530	669	759	616	413	508	392	685	498
26	449	573	964	500	664	756	590	393	454	357	714	461
27	447	681	898	490	686	732	566	379	420	352	706	444
28	445	765	874	490	680	705	550	365	401	356	652	427
29	446	762	943	480	670	696	552	355	387	374	585	429
30	445	785	1020	480	---	691	551	361	370	378	517	425
31	440	---	1030	460	---	684	---	396	---	386	465	---
TOTAL	12876	13842	23812	18491	13827	18447	24199	14194	20193	12898	17273	13957
MEAN	415	461	768	596	477	595	807	458	673	416	557	465
MAX	482	785	1030	975	686	759	1160	545	1050	607	714	560
MIN	293	352	548	460	399	445	550	355	370	336	384	389
CFSM	1.06	1.18	1.97	1.53	1.22	1.53	2.07	1.17	1.73	1.07	1.43	1.19
IN.	1.23	1.32	2.27	1.76	1.32	1.76	2.31	1.35	1.93	1.23	1.65	1.33

CAL YR 1979 TOTAL 215519 MEAN 590 MAX 2740 MIN 284 CFSM 1.51 IN 20.56
WTR YR 1980 TOTAL 204001 MEAN 557 MAX 1160 MIN 293 CFSM 1.43 IN 19.46

04102700 BLACK RIVER NEAR BANGOR, MI

LOCATION.--Lat 42°21'15", long 86°11'15", in NW¼ sec.28, T.1 S., R.16 W., Van Buren County, Hydrologic Unit 04050002, on left bank 50 ft (15 m) upstream from bridge on 66th Street, 4.9 mi (7.9 km) northwest of Bangor.

DRAINAGE AREA.--83.6 mi² (216.5 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period which are fair. Occasional regulation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 106 ft³/s (3.002 m³/s), 17.22 in/yr (437 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,320 ft³/s (37.4 m³/s) Apr. 19, 1975, gage height, 13.16 ft (4.011 m); minimum, 20 ft³/s (0.57 m³/s) Sept. 28, 1966, gage height, 1.83 ft (0.558 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 26	0500	532	15.1	8.81	2.685	June 8	0900	*965	27.3	*10.92	3.328
Apr. 10	2100	484	13.7	8.49	2.588	June 16	1500	448	12.7	8.13	2.478

Minimum discharge, 31 ft³/s (0.88 m³/s) Oct. 1, gage height, 2.06 ft (0.628 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	31	55	160	170	58	110	202	110	125	54	42	76
2	34	63	142	150	58	95	193	102	135	51	76	131
3	34	62	126	135	58	85	172	93	234	50	208	189
4	41	57	114	119	58	75	196	85	253	52	252	144
5	42	53	112	106	58	71	201	78	196	77	187	106
6	40	52	146	95	58	70	177	72	191	103	146	87
7	57	51	156	90	58	69	147	67	336	91	103	74
8	53	52	185	80	58	69	163	63	901	71	90	68
9	48	53	174	75	58	68	365	61	691	60	82	66
10	49	54	156	85	58	71	462	59	496	61	76	65
11	51	55	141	95	58	76	449	63	380	55	78	58
12	52	54	150	122	58	73	372	64	270	54	89	52
13	51	53	152	114	58	69	321	79	184	56	88	58
14	49	53	138	106	58	67	262	109	171	58	164	68
15	48	52	121	99	58	70	259	100	250	54	216	66
16	45	53	108	98	58	88	258	93	428	70	171	62
17	45	52	101	145	60	165	226	83	386	83	162	189
18	45	51	90	168	60	255	186	121	313	74	222	256
19	45	49	83	156	60	252	156	139	246	64	193	199
20	45	49	79	139	60	222	138	122	189	63	196	143
21	44	65	75	123	72	207	125	100	151	90	275	129
22	43	117	82	111	139	192	115	83	127	97	265	111
23	51	142	102	102	242	168	107	73	109	84	206	98
24	63	138	168	90	258	146	101	67	98	70	148	88
25	66	125	419	85	239	141	100	63	91	58	114	79
26	64	203	502	80	199	134	97	58	82	50	98	78
27	60	235	387	70	156	123	92	54	75	52	87	76
28	56	215	314	60	127	113	94	58	78	54	77	70
29	53	205	264	57	120	120	105	49	65	52	70	64
30	51	180	223	57	---	131	112	57	58	48	64	60
31	49	---	193	58	---	149	---	152	---	44	60	---
TOTAL	1505	2698	5363	3240	2720	3744	5953	2577	7309	2000	4385	3010
MEAN	48.5	89.9	173	105	93.8	121	198	83.1	244	64.5	141	100
MAX	66	235	502	170	258	255	462	152	901	103	208	256
MIN	31	49	75	57	58	67	92	49	58	44	42	52
CFSM	.58	1.08	2.07	1.26	1.12	1.45	2.37	.99	2.92	.77	1.69	1.20
IN.	.67	1.20	2.39	1.44	1.21	1.67	2.65	1.15	3.25	.89	1.95	1.34

CAL YR 1979 TOTAL 43938 MEAN 120 MAX 1040 MIN 29 CFSM 1.44 IN 19.55
WTR YR 1980 TOTAL 44504 MEAN 122 MAX 901 MIN 31 CFSM 1.46 IN 19.80

04103500 KALAMAZOO RIVER AT MARSHALL, MI

LOCATION.--Lat 42°15'55", long 84°57'55", on line between sec.25 and 26, T.2 S., R.6 W., Calhoun County, Hydrologic Unit 04050003, on left bank at upstream side of bridge on South Kalamazoo Ave. in Marshall.

DRAINAGE AREA.--449 mi² (1,163 km²).

PERIOD OF RECORD.--October 1948 to current year. Monthly discharge only for October 1948, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 877.09 ft (267.337 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 11, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good. Diurnal fluctuation caused by powerplant above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 313 ft³/s (8.864 m³/s), 9.47 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,130 ft³/s (60.3 m³/s) Mar. 29, 1950, gage height, 8.20 ft (2.499 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 2, 1967; minimum gage height, 3.00 ft (0.914 m) May 16, 1963; minimum daily discharge, 31 ft³/s (0.88 m³/s) Aug. 16, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,190 ft³/s (33.7 m³/s) Mar. 18, gage height, 6.24 ft (1.902 m); minimum, 51 ft³/s (1.44 m³/s) Oct. 11, gage height, 3.29 ft (1.003 m); minimum daily, 55 ft³/s (1.56 m³/s) Oct. 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	166	176	301	332	169	237	439	463	362	308	229	412
2	239	222	306	360	204	196	457	453	399	295	262	459
3	157	197	239	321	189	151	528	501	602	239	375	477
4	193	119	261	293	195	191	591	318	762	234	470	465
5	109	249	229	298	172	240	789	396	750	268	404	447
6	157	230	285	249	179	231	746	433	673	220	417	410
7	224	195	285	236	179	209	669	315	640	269	418	378
8	207	199	238	226	177	199	672	345	650	402	200	346
9	344	189	257	259	220	233	647	277	641	234	141	342
10	235	141	288	234	200	192	586	354	594	269	258	316
11	106	209	245	313	195	202	660	290	564	271	264	289
12	55	298	253	260	161	207	627	352	518	387	271	276
13	129	201	293	311	165	222	516	359	445	199	258	272
14	174	241	265	315	160	141	568	270	389	243	300	276
15	249	205	212	257	172	239	639	385	325	366	331	269
16	218	207	227	329	180	265	599	287	504	267	318	268
17	185	177	255	309	177	659	596	401	437	268	330	412
18	178	178	196	362	163	1160	463	467	420	321	311	442
19	151	204	214	327	183	1060	558	486	406	371	292	439
20	125	201	250	312	335	1010	434	571	309	277	504	423
21	172	228	215	278	277	946	441	495	396	214	601	393
22	248	175	193	272	274	856	347	362	278	257	628	383
23	239	308	274	251	439	768	372	333	406	235	620	391
24	217	343	371	265	358	676	446	351	266	244	544	378
25	199	329	545	211	305	678	335	322	239	216	447	370
26	205	345	689	229	388	619	425	293	380	211	389	362
27	180	377	646	230	259	498	413	278	305	248	335	341
28	180	443	638	235	249	599	401	283	79	254	298	322
29	224	298	567	193	243	562	513	284	196	242	269	304
30	174	326	390	194	---	507	570	264	355	293	254	295
31	188	---	394	224	---	491	---	328	---	287	277	---
TOTAL	5827	7208	10021	8493	6567	14444	16047	11316	13288	8409	11015	10957
MEAN	188	240	323	274	226	466	535	365	443	271	355	365
MAX	344	443	689	362	439	1160	789	571	762	402	628	477
MIN	55	119	193	193	160	141	335	264	79	199	141	268
CFSM	.42	.54	.72	.61	.50	1.04	1.19	.81	.99	.60	.79	.81
IN.	.48	.60	.83	.70	.54	1.20	1.33	.94	1.10	.70	.91	.91

CAL YR 1979 TOTAL 107780 MEAN 295 MAX 1190 MIN 55 CFSM .66 IN 8.93
WTR YR 1980 TOTAL 123592 MEAN 338 MAX 1160 MIN 55 CFSM .75 IN 10.24

04105000 BATTLE CREEK AT BATTLE CREEK, MI

LOCATION.--Lat 42°19'55", long 85°09'15", in NW¼ sec.5, T.2 S., R.7 W., Calhoun County, Hydrologic Unit 04050003, on right bank 350 ft (107 m) upstream from Emmett Street Bridge at Battle Creek, and 3.0 mi (4.8 km) upstream from mouth.

DRAINAGE AREA.--241 mi² (624 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to July 1933, January 1934 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1387: 1931, 1944. WSP 1507: 1956.

GAGE.--Water-stage recorder. Datum of gage is 823.24 ft (250.924 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to May 14, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except those for period of no gage-height record, Jan. 21 to Feb. 20, which are fair. Occasional slight regulation prior to November 1943. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--47 years (water years 1931, 1935-80), 198 ft³/s (5.607 m³/s), 11.16 in/yr (283 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 7, 1947, gage height, 4.48 ft (1.366 m), from floodmark; minimum, 22 ft³/s (0.62 m³/s) Aug. 14, 1934; minimum gage height, about -0.5 ft (-.152 m) in July 1936 and on Aug. 31, 1939, due to opening of gates at dam forming control.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 874 ft³/s (24.8 m³/s) Mar. 20, gage height, 1.91 ft (0.582 m); minimum, 50 ft³/s (1.42 m³/s) Oct. 1, gage height, 0.59 ft (0.180 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	50	87	258	344	95	180	405	279	175	101	120	180
2	55	98	246	300	93	150	416	291	185	101	142	193
3	58	101	204	257	94	142	422	289	232	97	232	214
4	57	115	209	228	93	142	434	276	264	93	305	247
5	57	102	191	176	90	140	449	252	294	101	410	265
6	60	91	206	134	89	133	496	231	327	105	496	263
7	65	96	191	138	88	140	533	208	344	118	496	230
8	65	116	184	134	88	135	517	194	349	115	441	194
9	62	127	189	134	89	130	511	186	349	109	371	170
10	60	128	190	130	93	138	541	179	339	110	310	164
11	64	119	180	146	92	134	584	180	335	106	257	164
12	66	105	156	138	90	130	596	181	310	103	218	171
13	69	104	172	172	88	150	560	189	263	104	183	170
14	68	99	158	180	90	143	512	242	220	99	184	167
15	66	98	115	184	88	138	474	300	213	96	177	171
16	66	98	134	176	89	167	452	331	242	111	167	198
17	67	108	111	180	90	273	434	326	284	136	158	257
18	69	95	122	191	90	371	422	333	338	144	150	294
19	67	92	126	198	90	568	402	360	354	142	141	338
20	66	91	118	199	98	838	376	404	322	126	194	398
21	66	107	115	193	111	829	338	426	263	116	263	410
22	70	147	118	185	167	766	305	393	218	110	349	376
23	84	189	138	165	232	715	282	338	180	106	474	338
24	94	222	176	150	274	676	257	284	150	100	526	344
25	94	235	252	135	327	600	247	237	136	94	488	398
26	90	251	316	125	273	528	242	198	123	91	415	360
27	84	291	422	115	320	475	241	174	111	98	354	354
28	79	300	514	110	265	434	246	154	107	111	294	327
29	78	289	488	100	194	414	252	141	101	126	247	289
30	75	270	434	96	---	397	268	133	97	134	203	247
31	75	---	388	95	---	399	---	162	---	130	179	---
TOTAL	2146	4363	6821	5208	3980	10575	12214	7871	7225	3433	8944	7891
MEAN	69.2	145	220	168	137	341	407	254	241	111	289	263
MAX	94	300	514	344	327	838	596	426	354	144	526	410
MIN	50	87	111	95	88	130	241	133	97	91	120	164
CFSM	.29	.60	.91	.70	.57	1.42	1.69	1.05	1.00	.46	1.20	1.09
IN.	.33	.67	1.05	.80	.61	1.63	1.89	1.21	1.12	.53	1.38	1.22

CAL YR 1979 TOTAL 80026 MEAN 219 MAX 1970 MIN 50 CFSM .91 IN 12.35
WTR YR 1980 TOTAL 80671 MEAN 220 MAX 838 MIN 50 CFSM .91 IN 12.45

04105500 KALAMAZOO RIVER NEAR BATTLE CREEK, MI

LOCATION.--Lat 42°19'26", long 85°11'51", in SW¼ sec.1, T.2 S., R.8 W., Calhoun County, Hydrologic Unit 04050003, on left bank 20 ft (6 m) upstream from bridge on Kendall Street in Battle Creek.

DRAINAGE AREA.--824 mi² (2,134 km²).

PERIOD OF RECORD.--July 1937 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1938-39. WSP 1387: 1938, 1945-46, 1948.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map (nearest 5 ft). Prior to Oct. 1, 1957, water-stage recorder at site 4.7 mi (7.6 km) downstream at different datum. Oct. 1, 1957, to June 15, 1959, nonrecording gage at bridge 1,800 ft (549 m) upstream at different datum. June 16, 1959, to Oct. 13, 1960, nonrecording gage at same site and datum.

REMARKS.--Records fair. Diurnal fluctuation, below 1,500 ft³/s (42.5 m³/s), caused by powerplants above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--43 years, 649 ft³/s (18.38 m³/s), 10.70 in/yr (272 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,290 ft³/s (206 m³/s) Apr. 7, 1947, gage height, 9.13 ft (2.783 m), site and datum then in use; minimum, 50 ft³/s (1.42 m³/s) Sept. 22, 1939, site then in use; minimum daily, 86 ft³/s (2.44 m³/s) Aug. 5, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,250 ft³/s (63.7 m³/s) June 7, gage height, 5.22 ft (1.591 m); minimum, 196 ft³/s (5.55 m³/s) Oct. 12, 13, gage height, 2.99 ft (0.911 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	238	449	770	850	421	534	1010	934	696	455	321	620
2	358	414	674	780	394	485	933	852	740	460	490	760
3	364	394	596	720	414	416	1130	866	1090	406	652	770
4	340	376	556	638	407	371	1210	765	1210	347	754	800
5	310	340	548	540	388	426	1300	723	1340	449	857	850
6	280	505	548	505	388	438	1350	753	1320	441	953	840
7	340	414	604	394	388	405	1320	647	1390	522	940	740
8	376	440	612	394	382	380	1390	557	1450	506	868	656
9	435	509	588	449	388	396	1390	559	1380	550	464	650
10	484	410	580	456	414	401	1400	543	1240	446	509	586
11	376	393	572	530	407	372	1380	637	1160	441	530	542
12	238	451	580	690	400	364	1410	546	1060	454	489	527
13	196	475	572	660	398	421	1350	734	881	482	441	547
14	280	422	542	638	394	347	1250	693	858	367	555	567
15	322	453	512	596	388	360	1270	724	778	397	517	527
16	382	463	434	564	400	466	1270	760	893	606	480	553
17	414	436	317	646	407	1110	1170	810	919	492	472	918
18	370	411	404	652	442	1700	1110	1150	944	468	484	1020
19	316	408	434	701	407	1820	1030	1010	959	502	468	1000
20	310	426	396	633	456	1970	1010	1140	912	512	776	1080
21	286	523	421	635	608	1970	846	1170	750	407	1050	1120
22	376	583	421	596	761	1780	822	899	679	358	1090	1040
23	491	598	449	540	808	1600	730	852	691	365	1220	1010
24	449	771	665	428	949	1500	737	784	628	331	1260	929
25	421	774	750	533	817	1360	707	720	499	310	1160	909
26	376	965	665	449	843	1280	707	598	490	284	986	910
27	400	880	1110	498	844	1130	735	557	503	292	827	895
28	370	921	1260	477	631	1110	785	534	424	398	701	830
29	364	830	1300	442	589	1130	791	513	249	382	612	767
30	352	780	1130	414	---	1020	970	517	379	377	533	685
31	358	---	910	407	---	1100	---	699	---	417	491	---
TOTAL	10972	16214	19920	17455	14923	28162	32513	23246	26422	13224	21950	23648
MEAN	354	540	643	563	515	908	1084	750	881	427	708	788
MAX	491	965	1300	850	949	1970	1410	1170	1450	606	1260	1120
MIN	196	340	317	394	382	347	707	513	249	284	321	527
CFSM	.43	.66	.78	.68	.63	1.10	1.32	.91	1.07	.52	.86	.96
IN.	.50	.73	.90	.79	.67	1.27	1.47	1.05	1.19	.60	.99	1.07

CAL YR 1979 TOTAL 236463 MEAN 648 MAX 3000 MIN 166 CFSM .79 IN 10.68
WTR YR 1980 TOTAL 248649 MEAN 679 MAX 1970 MIN 196 CFSM .82 IN 11.23

04105700 AUGUSTA CREEK NEAR AUGUSTA, MI

LOCATION.--Lat 42°21'12", long 85°21'14", in SW¼ sec.27, T.1 S., R.9 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 15 ft (5 m) downstream from bridge on EF Road, and 1.3 mi (2.1 km) north of Augusta.

DRAINAGE AREA.--38.9 mi² (100.8 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 815 ft (248 m) from topographic map. Prior to June 15, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 42.8 ft³/s (1.212 m³/s), 14.94 in/yr (379 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 560 ft³/s (15.9 m³/s) June 27, 1978, gage height, 3.41 ft (1.039 m); minimum, 8.9 ft³/s (0.25 m³/s) Jan. 26, 1978, result of freezeup; minimum gage height, 0.65 ft (0.198 m) Jan. 19, 1970.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 98 ft³/s (2.78 m³/s) Aug. 3, gage height, 1.94 ft (0.591 m); maximum gage height, 1.96 ft (0.597 m) Dec. 26; minimum discharge, 14 ft³/s (0.40 m³/s) Feb. 4, gage height, 0.73 ft (0.223 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	24	45	52	53	38	37	66	51	34	32	40	46
2	33	52	47	52	38	37	65	50	38	37	61	53
3	33	48	45	50	37	36	64	48	57	34	93	48
4	33	42	44	47	34	37	70	45	60	33	95	45
5	34	39	46	45	37	38	68	43	51	44	82	43
6	35	38	51	41	37	37	62	41	50	48	73	41
7	40	38	51	42	37	37	58	39	61	48	64	39
8	38	38	52	43	34	38	63	38	76	59	56	38
9	36	39	49	41	38	37	76	37	70	59	51	40
10	36	43	46	41	37	40	86	37	60	54	49	40
11	36	41	46	53	37	39	81	42	54	47	48	39
12	38	39	52	50	35	37	73	41	50	45	47	38
13	39	39	52	55	36	38	66	47	40	43	45	39
14	36	38	53	50	37	38	64	59	38	40	57	44
15	34	38	50	46	37	40	69	54	55	39	60	46
16	34	38	47	48	37	48	67	48	85	52	52	45
17	38	37	41	55	37	79	62	49	78	54	49	63
18	38	36	43	57	36	84	58	65	64	48	47	62
19	39	36	41	53	38	74	54	61	62	43	46	55
20	40	36	40	50	38	66	52	54	59	42	58	51
21	39	48	39	47	41	69	50	48	50	43	64	48
22	39	63	41	46	71	66	48	44	45	44	57	48
23	48	71	49	44	76	61	46	41	41	42	52	51
24	48	67	66	42	64	60	46	40	39	39	47	47
25	45	59	91	45	55	60	49	39	39	38	45	45
26	41	72	97	39	44	57	49	37	37	36	42	45
27	39	71	89	43	47	54	47	35	36	40	40	43
28	38	69	75	41	44	53	48	36	35	49	38	42
29	37	63	65	40	37	59	50	39	34	47	37	41
30	37	57	58	38	---	60	50	34	32	42	36	40
31	36	---	55	36	---	63	---	35	---	41	38	---
TOTAL	1161	1440	1673	1433	1214	1579	1807	1377	1530	1362	1669	1365
MEAN	37.5	48.0	54.0	46.2	41.9	50.9	60.2	44.4	51.0	43.9	53.8	45.5
MAX	48	72	97	57	76	84	86	65	85	59	95	63
MIN	24	36	39	36	34	36	46	34	32	32	36	38
CFSM	.96	1.23	1.39	1.19	1.08	1.31	1.55	1.14	1.31	1.13	1.38	1.17
IN.	1.11	1.38	1.60	1.37	1.16	1.51	1.73	1.32	1.46	1.30	1.60	1.31

CAL YR 1979 TOTAL 17452 MEAN 47.8 MAX 121 MIN 21 CFSM 1.23 IN 16.69
WTR YR 1980 TOTAL 17610 MEAN 48.1 MAX 97 MIN 24 CFSM 1.24 IN 16.84

04106000 KALAMAZOO RIVER AT COMSTOCK, MI

LOCATION.--Lat 42°17'05", long 85°30'50", in NE¼ sec.19, T.2 S., R.10 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on River Street in Comstock, 0.2 mi (0.3 km) downstream from Comstock Creek.

DRAINAGE AREA.--1,010 mi² (2,620 km²), approximately.

PERIOD OF RECORD.--April to August 1931, October 1932 to December 1979 (discontinued). Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1933-36. WSP 1387: 1933, 1934(M), 1935, 1936(M), 1938(M), 1940(M), 1941.

GAGE.--Water-stage recorder. Datum of gage is 759.12 ft (231.380 m) National Geodetic Vertical Datum of 1929. Prior to November 1945, nonrecording gage at same site and datum.

REMARKS.--Records good. Flow regulated by powerplants above station.

AVERAGE DISCHARGE.--47 years (water years 1933-79), 845 ft³/s (23.93 m³/s), 11.36 in/yr (289 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,910 ft³/s (196 m³/s) Apr. 8, 1947, gage height 7.94 ft (2.420 m); minimum, 119 ft³/s (3.37 m³/s) May 29, 1958, gage height, 0.09 ft (0.027 m); minimum daily, 185 ft³/s (5.24 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1979 to December 1979, 1,590 ft³/s (45.0 m³/s) Dec. 29, gage height, 2.38 ft (0.725 m); minimum, 377 ft³/s (10.7 m³/s) Oct. 1, gage height, 0.82 ft (0.250 m); minimum daily, 384 ft³/s (10.9 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	384	674	1080									
2	419	739	1040									
3	475	660	985									
4	496	642	920									
5	485	613	844									
6	480	586	856									
7	477	637	897									
8	511	652	937									
9	529	637	921									
10	605	639	895									
11	703	617	882									
12	617	618	929									
13	479	664	917									
14	400	628	874									
15	484	631	855									
16	506	640	833									
17	564	636	791									
18	643	618	659									
19	627	597	776									
20	569	593	731									
21	535	667	706									
22	527	800	722									
23	611	935	746									
24	813	962	946									
25	772	1000	1290									
26	644	1220	1480									
27	572	1250	1510									
28	590	1220	1560									
29	628	1240	1580									
30	552	1150	1560									
31	567	---	1430									
TOTAL	17264	23165	31152	---	---	---	---	---	---	---	---	---
MEAN	557	772	1005	---	---	---	---	---	---	---	---	---
MAX	813	1250	1580	---	---	---	---	---	---	---	---	---
MIN	384	586	659	---	---	---	---	---	---	---	---	---
CFSM	.55	.76	1.00	---	---	---	---	---	---	---	---	---
IN.	.64	.85	1.15	---	---	---	---	---	---	---	---	---

CAL YR 1979 TOTAL 334199 MEAN 916 MAX 3770 MIN 345 CFSM .91 IN 12.31

04106300 PORTAGE CREEK NEAR KALAMAZOO, MI

LOCATION.--Lat 42°14'46", long 85°34'33", in SE¼ sec.34, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 25 ft (8 m) upstream from bridge on Lovers Lane, and 3.0 mi (4.8 km) south of Kalamazoo.

DRAINAGE AREA.--22.4 mi² (58.0 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 814.88 ft (248.375 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 2.0 mi (3.2 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 40.2 ft³/s (1.138 m³/s), 24.37 in/yr (619 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) June 26, 1978, gage height, 4.49 ft (1.369 m); minimum, 8.0 ft³/s (0.23 m³/s) Jan. 19, 1965, gage height, 0.88 ft (0.268 m), result of bridge construction upstream.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) (revised) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Nov. 26	0300	120	3.40	3.05	0.930	June 7	1900	*153	4.33	*3.37	1.027
Dec. 24	2400	113	3.20	2.98	0.908	Aug. 2	1500	124	3.51	3.15	0.960
Apr. 8	2100	102	2.89	2.85	0.869	Aug. 14	0700	131	3.71	3.26	0.994
June 3	0600	118	3.34	3.05	0.924	Aug. 20	1400	140	3.96	3.35	1.021

Minimum discharge, 24 ft³/s (0.68 m³/s) Oct. 16; minimum gage height, 1.55 ft (0.472 m) July 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	28	45	37	36	37	38	46	48	41	34	35	61
2	32	35	33	38	37	36	48	46	41	33	85	63
3	30	33	35	38	35	38	53	49	85	31	79	52
4	29	30	35	40	37	41	57	45	47	28	48	49
5	30	32	38	38	38	40	50	47	43	42	49	45
6	31	33	40	36	38	41	45	46	46	33	42	44
7	35	33	43	42	37	42	48	45	83	34	40	41
8	31	35	40	46	37	42	61	44	84	34	38	44
9	30	36	35	45	36	40	65	41	57	36	36	44
10	29	36	37	46	35	44	61	41	50	34	39	43
11	31	34	37	58	37	42	53	43	45	32	40	44
12	29	33	41	47	40	39	52	41	43	46	41	47
13	28	33	37	42	39	42	46	49	41	47	39	46
14	27	32	37	45	40	44	54	43	43	36	90	42
15	27	33	35	45	42	42	55	42	52	35	53	41
16	27	33	33	47	39	43	48	42	45	54	43	42
17	28	31	33	51	36	74	48	52	43	37	50	68
18	29	29	32	48	38	57	47	61	42	34	48	46
19	29	32	32	43	40	50	45	46	43	33	51	41
20	28	32	33	41	41	51	43	41	41	31	98	43
21	27	48	34	46	42	57	44	35	38	33	78	39
22	35	52	34	59	72	49	46	35	36	33	57	44
23	40	49	39	45	55	46	44	34	39	31	49	48
24	34	39	66	42	47	49	46	33	40	32	43	45
25	33	43	79	42	45	47	45	30	39	30	43	41
26	32	85	51	39	40	45	43	29	37	29	42	42
27	31	50	44	38	40	45	42	32	32	41	42	43
28	30	47	43	39	40	45	46	32	29	48	41	42
29	30	41	41	40	40	51	50	35	28	35	42	45
30	31	39	38	40	---	46	54	37	30	32	38	46
31	31	---	36	38	---	49	---	40	---	32	41	---
TOTAL	942	1163	1228	1340	1180	1415	1485	1284	1363	1100	1560	1381
MEAN	30.4	38.8	39.6	43.2	40.7	45.6	49.5	41.4	45.4	35.5	50.3	46.0
MAX	40	85	79	59	72	74	65	61	85	54	98	68
MIN	27	29	32	36	35	36	42	29	28	28	35	39

CAL YR 1979 TOTAL 15366 MEAN 42.1 MAX 101 MIN 26
WTR YR 1980 TOTAL 15441 MEAN 42.2 MAX 98 MIN 27

04106320 WEST FORK PORTAGE CREEK NEAR OSHTEMO, MI

LOCATION.--Lat 42°14'07", long 85°38'54", in SE¼ sec.1, T.3 S., R.12 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank at upstream side of culvert on 12th Street, 2.1 mi (3.4 km) southeast of Oshtemo.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--May 1972 to current year.

GAGE.--Water-stage recorder. Datum of gage is 868.86 ft (264.829 m) Kalamazoo County Road Commission datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 7.92 ft³/s (0.224 m³/s), 8.27 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 26 ft³/s (0.74 m³/s) Aug. 31, 1975, gage height, 2.15 ft (0.655 m); minimum, 2.0 ft³/s (0.057 m³/s) Aug. 2, 3, 4, 1977; minimum gage height, 1.08 ft (0.329 m) July 23, 24, 27, 28, 29, Aug. 2, 3, 4, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 14 ft³/s (0.40 m³/s) Dec. 25, gage height, 1.77 ft (0.539 m); minimum, 3.3 ft³/s (0.093 m³/s) June 29, 30, gage height, 1.17 ft (0.357 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	5.7	7.5	8.2	6.0	6.2	7.3	6.8	6.4	3.6	5.0	5.5
2	4.8	5.9	6.8	7.8	5.9	6.0	7.3	6.6	6.9	3.8	6.8	6.0
3	5.2	5.7	6.6	7.5	5.9	5.9	7.5	6.4	9.3	3.6	9.3	6.0
4	5.2	5.3	6.2	6.9	5.9	5.9	8.0	6.2	9.3	4.1	9.3	6.0
5	5.3	5.2	6.4	6.6	5.9	6.0	7.8	6.0	8.9	5.0	8.9	5.7
6	5.5	5.2	6.4	6.2	5.9	6.0	7.8	5.9	8.7	5.2	8.4	5.3
7	6.8	5.2	6.8	6.2	5.9	6.0	7.3	5.5	10	5.2	7.5	5.2
8	7.3	5.3	6.9	6.2	5.7	6.2	7.5	5.5	11	5.2	6.8	5.0
9	6.9	5.3	6.6	6.0	5.9	6.4	8.6	5.5	12	5.2	6.2	4.8
10	6.6	5.2	6.4	6.0	5.9	6.4	8.7	5.7	9.5	5.2	6.2	4.7
11	6.4	5.2	6.2	6.9	5.9	6.2	8.4	6.0	8.4	5.2	6.2	4.5
12	6.4	5.2	6.8	7.1	5.9	6.0	8.2	6.2	7.3	6.0	6.2	4.5
13	6.2	5.2	6.6	6.9	5.9	6.0	7.7	6.4	6.2	7.7	6.0	5.0
14	5.9	5.2	6.2	6.9	5.9	6.2	7.1	6.6	6.4	7.5	7.8	5.2
15	5.5	5.2	5.9	6.8	5.9	6.0	7.7	6.4	6.8	7.1	8.2	5.2
16	5.5	5.2	5.7	6.9	6.0	6.4	7.5	6.2	6.8	7.5	7.8	5.2
17	5.3	5.0	5.5	7.8	5.9	8.6	7.1	6.6	6.6	7.1	7.8	6.4
18	5.5	5.0	5.5	7.7	5.9	9.5	6.8	8.4	6.0	6.6	7.5	6.4
19	5.5	5.0	5.3	7.3	5.9	9.1	6.6	8.4	6.0	6.4	6.9	6.4
20	5.3	5.2	5.3	6.9	6.0	8.6	6.2	7.7	5.9	6.0	8.0	6.2
21	5.3	6.2	5.5	6.6	6.0	8.7	6.0	7.3	5.7	5.9	8.2	5.9
22	5.3	6.8	6.2	6.6	8.0	8.4	5.9	6.9	5.2	5.7	8.0	5.5
23	6.4	7.6	8.0	6.4	9.1	7.7	5.5	6.6	5.0	5.3	7.3	5.3
24	6.6	7.4	10	6.4	8.7	7.5	5.5	6.4	4.8	5.2	6.6	5.2
25	6.2	8.3	13	6.4	8.2	7.5	5.5	6.4	4.5	5.0	6.2	5.0
26	5.9	11	13	6.4	7.5	7.3	5.5	6.4	4.3	5.0	5.7	4.9
27	5.5	10	12	6.4	7.1	6.9	5.5	6.4	4.1	5.7	5.5	4.8
28	5.3	9.6	11	6.2	6.8	6.6	5.5	6.2	3.8	6.0	5.2	4.7
29	5.2	9.0	9.6	6.2	6.4	6.9	6.2	6.0	3.8	5.9	5.2	4.5
30	5.0	8.4	9.3	6.2	---	6.9	6.6	6.2	3.6	5.7	5.0	4.4
31	5.0	---	8.7	6.0	---	7.1	---	6.2	---	5.3	5.0	---
TOTAL	177.3	189.7	231.9	208.6	185.9	215.1	208.8	200.0	203.4	173.9	214.7	159.4
MEAN	5.72	6.32	7.48	6.73	6.41	6.94	6.96	6.45	6.78	5.61	6.93	5.31
MAX	7.3	11	13	8.2	9.1	9.5	8.7	8.4	12	7.7	9.3	6.4
MIN	4.5	5.0	5.3	6.0	5.7	5.9	5.5	5.5	3.6	3.6	5.0	4.4
CFSM	.44	.49	.58	.52	.49	.53	.54	.50	.52	.43	.53	.41
IN.	.51	.54	.66	.60	.53	.62	.60	.57	.58	.50	.61	.46

CAL YR 1979 TOTAL 2296.2 MEAN 6.29 MAX 13 MIN 3.5 CFSM .48 IN 6.57
WTR YR 1980 TOTAL 2368.7 MEAN 6.47 MAX 13 MIN 3.6 CFSM .50 IN 6.78

04106400 WEST FORK PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°14'40", long 85°36'50", in NE¼ sec.5, T.3 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on right bank 30 ft (9 m) upstream from culvert on Oakland Drive, 2.5 mi (4.0 km) upstream from mouth, and 3.7 mi (6.0 km) southwest of main business district of Kalamazoo.

DRAINAGE AREA.--18.7 mi² (48.4 km²).

PERIOD OF RECORD.--September 1959 to current year.

GAGE.--Water-stage recorder and V-notch sharp-crested weir. Datum of gage is 858.09 ft (261.546 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good. At times flow is affected by ground-water withdrawals. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 10.0 ft³/s (0.283 m³/s), 7.26 in/yr (184 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 41 ft³/s (1.16 m³/s) Apr. 19, 1975, gage height, 3.32 ft (1.012 m); minimum, 1.0 ft³/s (0.028 m³/s) Aug. 9, 1964; minimum gage height, 0.88 ft (0.268 m) July 30, 1963, caused by construction.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 26 ft³/s (0.74 m³/s) Dec. 25, gage height, 2.95 ft (0.899 m); minimum, 4.9 ft³/s (0.14 m³/s) July 3, 4, gage height, 2.35 ft (0.716 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.1	11	14	13	10	12	13	11	10	6.0	7.5	10
2	8.9	11	12	13	10	11	12	11	11	7.0	10	11
3	8.9	11	12	12	10	11	13	10	17	5.6	15	12
4	8.9	11	11	11	10	11	15	9.5	15	5.1	15	11
5	9.2	10	11	11	10	11	14	9.2	13	8.4	15	10
6	9.5	10	11	11	10	11	13	8.6	13	9.8	14	9.5
7	11	10	12	11	10	11	12	8.4	17	9.2	12	8.9
8	12	9.8	13	11	10	12	14	8.4	19	9.2	11	8.6
9	12	9.8	12	11	10	12	17	8.4	18	8.9	10	8.6
10	12	10	11	11	10	12	17	8.6	15	8.6	10	8.6
11	12	10	11	11	10	11	15	9.5	13	8.1	10	8.4
12	12	10	12	12	10	11	15	9.5	11	8.9	10	7.8
13	12	10	11	11	10	11	14	10	10	12	10	7.8
14	11	9.8	11	11	10	12	13	10	10	11	12	8.1
15	11	9.5	10	11	10	11	14	9.8	12	10	13	8.1
16	10	9.5	10	11	10	13	14	9.8	14	11	13	8.4
17	10	9.5	9.8	12	10	18	13	11	12	12	13	12
18	10	9.2	9.5	12	10	18	12	15	11	10	12	12
19	11	8.9	9.5	12	10	16	11	14	10	9.5	11	11
20	11	8.9	9.2	11	11	15	11	13	10	8.9	13	11
21	10	11	8.9	11	11	15	10	12	9.2	8.6	13	10
22	11	13	9.2	10	16	14	10	11	8.9	8.9	13	10
23	12	15	11	10	17	13	9.5	11	8.6	8.6	12	10
24	12	14	16	10	16	13	9.2	10	8.1	8.1	11	9.5
25	12	14	25	10	15	12	9.2	9.8	7.5	7.5	10	9.2
26	11	21	23	10	14	12	8.9	9.5	7.3	7.5	9.5	8.9
27	11	18	20	10	13	12	8.9	9.5	7.0	8.4	8.9	8.6
28	11	18	18	10	12	11	9.2	9.5	6.3	8.9	8.6	8.4
29	10	16	16	10	12	12	10	9.5	5.1	8.4	8.4	8.1
30	9.8	15	15	10	---	12	11	9.8	5.4	8.1	8.6	7.8
31	9.5	---	14	10	---	13	---	9.8	---	7.8	8.6	---
TOTAL	329.8	353.9	398.1	340	327	389	367.9	316.1	334.2	270.0	348.1	283.3
MEAN	10.6	11.8	12.8	11.0	11.3	12.5	12.3	10.2	11.1	8.71	11.2	9.44
MAX	12	21	25	13	17	18	17	15	19	12	15	12
MIN	8.1	8.9	8.9	10	10	11	8.9	8.4	5.1	5.1	7.5	7.8
CFSM	.57	.63	.68	.59	.60	.67	.66	.55	.59	.47	.60	.51
IN.	.66	.70	.79	.68	.65	.77	.73	.63	.66	.54	.69	.56

CAL YR 1979 TOTAL 3883.9 MEAN 10.6 MAX 25 MIN 5.0 CFSM .57 IN 7.73
WTR YR 1980 TOTAL 4057.4 MEAN 11.1 MAX 25 MIN 5.1 CFSM .59 IN 8.07

04106500 PORTAGE CREEK AT KALAMAZOO, MI

LOCATION.--Lat 42°16'27", long 85°34'35", in NW¼ NE¼ sec.27, T.2 S., R.11 W., Kalamazoo County, Hydrologic Unit 04050003, on left bank 50 ft (15 m) upstream from bridge on Reed Avenue in Kalamazoo, and 1.5 miles (2.4 km) upstream from mouth.

DRAINAGE AREA.--46.8 mi² (121.2 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to September 1958, June 1975 to current year. Monthly discharge only for some periods, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 761.50 ft (232.105 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Dec. 15, 1947, to Dec. 7, 1955, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good. Some regulation by millponds upstream from station. Flow includes water which is pumped from ground-water sources by industry and discharged into stream 5.0 mi (8.0 km) upstream from station.

AVERAGE DISCHARGE.--16 years (water years 1948-58, 1976-80), 54.5 ft³/s (1.543 m³/s), 15.81 in/yr (402 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 580 ft³/s (16.4 m³/s) sometime in July 1954 from rating curve extended above 165 ft³/s (4.67 m³/s), gage height, 5.25 ft (1.600 m) caused by momentary gate opening of millpond; maximum gage height, 5.44 ft (1.658 m) June 26, 1978; minimum discharge, 2.0 ft³/s (0.057 m³/s) May 8, 1956, gage height, 1.50 ft (0.457 m); minimum gage height, 1.41 ft (0.430 m) May 12, 13, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 186 ft³/s (5.27 m³/s) Dec. 24, gage height, 3.80 ft (1.158 m); minimum, 3.3 ft³/s (0.093 m³/s) May 12, 13, gage height, 1.41 ft (0.430 m); minimum daily, 33 ft³/s (0.93 m³/s) June 29, July 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	34	62	51	38	43	44	56	57	53	46	41	83
2	43	45	46	64	45	42	61	58	53	40	88	81
3	36	41	45	64	45	43	75	59	116	36	122	68
4	36	41	47	51	43	48	83	56	58	37	70	61
5	35	41	48	50	45	51	63	56	55	60	62	58
6	41	42	51	46	45	44	54	56	60	44	58	55
7	49	41	57	48	43	41	53	53	105	44	51	54
8	39	44	55	55	42	66	82	54	121	41	49	54
9	38	45	47	56	44	73	106	50	71	49	47	58
10	40	45	46	56	44	60	87	51	63	40	53	54
11	42	42	48	81	45	57	68	56	54	37	53	53
12	41	41	55	66	48	46	66	51	54	65	52	56
13	40	42	47	58	46	50	52	64	51	61	48	58
14	37	40	46	58	46	57	67	53	54	44	107	53
15	37	41	46	49	51	54	71	52	71	43	79	51
16	37	41	44	65	50	57	56	51	59	73	57	55
17	38	41	40	61	43	126	59	68	54	47	69	95
18	40	38	41	56	44	92	58	89	52	42	63	62
19	39	39	41	51	49	72	56	60	54	39	62	55
20	38	40	42	48	55	69	54	55	50	38	101	55
21	36	66	43	48	59	85	54	48	47	40	119	52
22	47	70	44	52	116	69	57	47	45	39	82	56
23	55	63	53	46	98	65	55	46	44	37	62	61
24	44	57	102	45	67	67	56	46	46	36	57	55
25	43	58	148	48	58	63	55	43	45	35	56	51
26	42	127	82	45	48	57	54	41	46	33	55	52
27	40	70	70	43	52	55	53	39	39	45	54	51
28	39	66	62	45	50	57	56	39	35	57	52	51
29	39	58	60	48	46	71	60	45	33	44	52	52
30	39	55	55	46	---	58	65	47	34	40	49	53
31	40	---	50	44	---	66	---	51	---	38	58	---
TOTAL	1244	1542	1712	1631	1510	1905	1892	1641	1722	1370	2028	1753
MEAN	40.1	51.4	55.2	52.6	52.1	61.5	63.1	52.9	57.4	44.2	65.4	58.4
MAX	55	127	148	81	116	126	106	89	121	73	122	95
MIN	34	38	40	38	42	41	52	39	33	33	41	51

CAL YR 1979 TOTAL 18691 MEAN 51.2 MAX 158 MIN 30
WTR YR 1980 TOTAL 19950 MEAN 54.5 MAX 148 MIN 33

04106500 PORTAGE CREEK AT KALAMAZOO, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: April 1972 to August 1974, August 1975 to current year.

INSTRUMENTATION.--Temperature recorder April 1972 to August 1974, August 1975 to current year.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 32.0°C April 18, 1980; minimum, 0.0°C Dec. 31, 1976, Jan. 1, 2, 1977.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 32.0°C April 18; minimum, 3.0°C Dec. 16-18.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.0	15.5	17.5	15.0	11.5	13.5	6.0	5.0	6.0	7.0	6.0	6.5
2	18.0	16.5	17.0	11.5	9.5	10.5	6.5	4.5	5.5	6.0	5.5	6.0
3	16.5	15.5	16.5	9.5	8.5	9.0	6.0	3.5	5.5	6.5	5.5	6.0
4	16.5	14.0	15.0	11.0	9.0	10.0	6.5	4.0	5.5	6.0	5.5	6.0
5	14.5	13.0	13.5	10.5	9.0	10.0	7.5	5.5	6.5	6.0	5.5	6.0
6	13.5	12.0	12.5	11.0	10.0	10.5	7.0	6.0	6.5	6.0	4.5	5.5
7	13.0	11.5	12.0	10.0	8.5	9.0	6.0	5.0	6.0	5.0	4.0	4.5
8	13.5	11.5	12.0	11.0	8.5	9.5	6.0	5.0	5.5	6.0	5.0	6.0
9	13.0	12.0	12.5	9.0	6.5	7.5	6.0	4.0	5.0	7.5	6.5	6.5
10	12.5	10.5	11.5	7.5	6.5	7.0	6.5	5.0	5.5	7.5	6.5	7.0
11	12.0	10.0	10.5	8.0	6.5	7.5	9.0	6.5	7.5	8.0	6.5	7.0
12	11.5	10.0	11.0	7.5	6.0	7.0	8.5	7.0	7.5	7.5	6.5	7.0
13	11.0	9.0	10.0	8.0	6.5	7.5	6.5	5.0	6.0	7.5	6.5	6.5
14	12.0	9.5	11.0	7.0	6.0	6.5	6.5	4.5	6.0	7.5	6.5	6.5
15	11.5	9.5	11.0	8.0	6.5	7.5	6.0	4.5	5.5	8.5	6.5	7.0
16	12.5	11.5	12.0	8.0	7.5	8.0	5.5	3.0	4.5	7.5	6.5	7.0
17	13.0	12.0	12.5	10.0	7.5	8.5	4.0	3.0	3.5	8.5	8.0	8.0
18	14.0	12.5	13.5	11.0	9.0	10.0	4.5	3.0	3.5	8.5	8.0	8.0
19	15.0	13.5	14.5	11.5	10.5	11.0	6.0	4.5	5.0	8.5	8.5	8.5
20	17.0	14.0	15.5	11.5	10.5	11.0	6.0	5.0	5.5	8.5	8.0	8.0
21	18.5	17.0	17.5	11.5	9.5	10.5	6.5	5.0	5.5	8.5	7.5	8.0
22	19.5	17.0	18.5	11.0	10.5	11.0	6.5	5.5	6.0	8.5	7.5	8.0
23	17.0	11.5	14.0	11.0	9.5	10.0	7.5	6.5	7.0	7.5	6.0	7.0
24	11.5	10.5	11.0	9.5	8.0	9.0	8.5	6.5	7.5	6.5	5.5	6.5
25	10.5	9.0	10.5	8.5	7.0	8.0	7.0	5.0	6.0	8.5	6.5	8.0
26	10.5	8.5	9.5	8.0	7.0	7.5	5.5	5.0	5.0	8.0	7.0	7.5
27	11.0	9.0	10.0	8.0	7.0	7.5	6.0	5.5	5.5	8.5	7.5	8.0
28	12.5	11.0	11.5	8.0	7.0	7.5	7.0	6.5	6.5	8.5	6.5	7.5
29	13.0	10.5	12.0	7.0	5.5	6.0	7.0	7.0	7.0	8.0	6.5	7.0
30	12.5	10.5	12.0	6.0	6.0	6.0	7.5	7.0	7.0	7.5	6.5	7.0
31	15.0	12.0	13.5	---	---	---	7.0	7.0	7.0	7.0	6.0	6.5
MONTH	19.5	8.5	13.0	15.0	5.5	9.0	9.0	3.0	6.0	8.5	4.0	7.0

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	7.0	5.5	6.5	---	---	---	9.5	8.5	9.0	17.0	12.5	15.0
2	9.0	6.5	7.5	---	---	---	10.0	9.0	9.5	21.0	14.5	16.5
3	8.5	6.5	8.0	---	---	---	10.5	9.0	10.0	21.5	13.0	16.0
4	8.0	6.5	7.0	---	---	---	10.0	9.5	9.5	21.0	14.5	17.0
5	8.5	7.0	8.0	---	---	---	12.5	9.0	10.0	20.5	16.0	17.0
6	8.5	6.5	8.0	---	---	---	25.0	7.5	12.5	21.0	17.5	19.0
7	9.5	7.5	8.5	---	---	---	27.0	12.0	19.0	17.5	14.5	16.0
8	8.5	7.5	8.0	---	---	---	15.0	11.5	13.5	15.5	12.0	13.5
9	9.0	8.5	8.5	---	---	---	14.5	11.5	12.5	16.0	10.5	13.0
10	9.5	7.5	8.5	---	---	---	11.5	9.5	10.5	15.5	12.5	14.0
11	8.5	6.5	7.5	---	---	---	11.5	10.0	10.5	16.0	11.0	13.0
12	10.0	7.5	8.0	---	---	---	12.0	11.0	11.5	16.0	12.0	13.5
13	8.5	6.5	8.0	---	---	---	12.0	9.5	11.0	19.0	15.5	17.5
14	9.5	7.0	8.5	---	---	---	17.0	8.5	13.0	18.0	14.5	16.5
15	9.5	8.0	8.5	---	---	---	9.5	8.5	9.5	20.0	16.0	17.5
16	8.0	7.0	7.5	---	---	---	9.5	8.0	9.0	22.5	15.5	18.5
17	8.0	6.5	7.5	---	---	---	23.0	9.5	15.0	21.5	15.0	18.5
18	8.0	5.5	7.0	---	---	---	32.0	13.0	20.5	20.5	17.0	18.5
19	10.0	8.0	9.0	---	---	---	22.0	13.5	17.5	27.5	16.5	19.5
20	10.0	8.5	9.0	---	---	---	21.0	13.0	17.5	23.5	17.0	20.5
21	10.0	9.0	9.5	---	---	---	23.5	13.0	18.5	20.5	16.0	18.0
22	---	---	---	---	---	---	19.5	14.5	16.5	23.5	17.5	20.0
23	---	---	---	---	---	---	21.5	15.5	17.5	21.5	18.5	20.5
24	---	---	---	---	---	---	19.5	12.5	15.0	24.0	18.0	20.0
25	---	---	---	---	---	---	16.5	12.5	14.5	23.0	17.5	20.0
26	---	---	---	---	---	---	16.5	13.0	14.5	22.5	17.0	20.5
27	---	---	---	12.0	7.5	8.5	16.5	12.5	15.0	25.0	17.0	20.0
28	---	---	---	12.0	9.0	9.5	18.0	13.0	16.0	24.5	20.5	22.0
29	---	---	---	10.5	9.0	9.5	16.5	15.0	16.0	24.0	18.5	21.0
30	---	---	---	10.0	9.5	9.5	16.0	13.5	15.0	22.0	18.0	20.0
31	---	---	---	10.0	9.0	9.5	---	---	---	22.5	17.5	20.0
MONTH							32.0	7.5	13.5	27.5	10.5	18.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	23.0	17.0	19.0	23.5	19.0	20.5	25.0	20.0	23.0	22.0	19.0	20.0
2	27.5	20.5	23.5	26.5	20.0	23.0	23.5	17.5	20.0	22.5	18.5	20.5
3	27.5	21.5	24.0	24.0	20.0	22.5	21.5	16.0	19.0	23.5	18.0	20.5
4	22.0	17.5	20.0	23.5	19.0	21.0	22.5	17.0	20.5	22.5	17.0	20.0
5	20.5	17.0	19.0	23.5	18.5	20.5	22.0	19.0	21.0	22.5	19.0	21.0
6	21.0	17.0	19.0	23.0	17.5	20.5	22.0	18.0	20.0	22.5	18.5	20.0
7	22.0	18.5	20.0	25.0	17.5	21.5	22.0	20.0	21.0	19.5	16.0	18.0
8	20.5	15.5	18.0	29.0	23.5	25.5	24.0	21.5	22.5	21.0	16.0	18.5
9	21.0	16.5	18.5	25.0	21.0	22.5	24.0	21.0	22.5	19.5	18.0	19.0
10	21.5	15.5	18.5	30.5	19.5	24.0	23.5	21.5	22.5	19.0	15.5	17.0
11	21.0	14.5	18.0	25.5	21.0	22.5	22.0	19.5	21.0	19.0	14.0	16.5
12	24.5	16.0	19.5	21.0	19.0	20.0	23.0	19.0	21.0	17.5	15.5	16.0
13	23.0	19.5	21.5	25.0	18.0	21.0	21.5	18.5	20.0	20.0	15.5	17.5
14	22.0	19.0	20.0	28.0	19.5	23.5	21.5	18.5	20.0	19.0	17.0	18.5
15	21.5	17.5	19.5	29.0	24.5	26.0	22.0	20.5	21.5	18.0	15.5	16.5
16	21.5	16.5	19.0	26.5	20.5	24.0	21.5	16.0	18.5	21.0	15.0	17.0
17	22.5	17.0	19.5	26.5	21.5	24.5	18.0	15.5	16.5	18.5	14.5	16.0
18	22.5	17.5	20.0	25.5	20.0	22.0	21.5	15.5	18.5	19.0	13.5	16.0
19	23.0	17.0	20.0	22.5	19.5	21.0	22.0	17.0	19.5	19.5	15.0	17.5
20	20.5	14.0	17.5	25.5	19.5	22.5	21.5	17.0	20.0	21.0	17.5	19.0
21	23.0	17.0	20.0	25.5	22.0	24.5	21.5	19.0	20.0	21.0	18.0	19.5
22	24.5	17.5	21.0	24.5	21.5	22.5	22.0	18.0	20.5	19.5	18.0	19.0
23	25.5	20.5	23.0	23.0	19.0	21.0	21.5	17.0	19.5	18.5	15.5	17.0
24	27.0	21.5	24.0	25.5	19.5	22.5	21.5	17.0	19.5	18.0	14.5	16.5
25	27.0	21.5	24.5	25.0	19.0	22.0	21.0	18.0	19.5	18.0	15.5	16.5
26	27.0	23.0	25.0	23.5	21.0	22.5	22.5	17.5	20.5	16.0	15.0	15.5
27	26.5	23.5	25.0	22.5	18.5	20.0	23.0	18.5	21.0	15.5	12.5	14.5
28	26.0	21.5	24.0	21.5	18.0	19.5	23.5	19.0	21.0	16.5	13.0	15.0
29	24.5	21.5	23.5	24.0	17.0	20.5	23.5	19.0	21.5	18.0	14.5	16.5
30	23.0	19.5	21.0	20.5	17.5	19.0	22.5	19.0	21.5	19.0	15.0	16.5
31	---	---	---	24.0	18.5	21.0	22.0	18.0	20.0	---	---	---
MONTH	27.5	14.0	21.0	30.5	17.0	22.0	25.0	15.5	20.5	23.5	12.5	17.5

04108500 KALAMAZOO RIVER NEAR FENNVILLE, MI

LOCATION.--Lat 42°35'36", long 85°59'03", in NE¼ sec.5, T.2 N., R.14 W., Allegan County, Hydrologic Unit 04050003, on left bank 40 ft (12 m) upstream from bridge on State Highway 89, 2.1 mi (3.4 km) downstream from Swan Creek, 4.0 mi (6.4 km) downstream from Calkins Dam, and 6.1 mi (9.8 km) east of Fennville.

DRAINAGE AREA.--1,600 mi^2 (4,144 km^2), approximately.

PERIOD OF RECORD.--April 1929 to September 1936, October 1937 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "near Allegan" April 1929 to September 1932; as "at Calkins Bridge, near Allegan" October 1932 to September 1936, October 1937 to September 1938; as "at Calkins Dam, near Allegan" October 1938 to September 1950.

REVISED RECORDS.--WSP 1387: 1929(M), 1930, 1933, 1934-36(M), 1938(M), 1939-40, 1942.

GAGE.--Water-stage recorder. Datum of gage is 586.51 ft (178.768 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). April 1929 to September 1936 at bridge and October 1937 to September 1950 in powerplant, 4.0 mi (6.4 km) upstream at NGVD (levels by city of Allegan).

REMARKS.--Records good. Flow regulated at low and medium stages by powerplants upstream from station and since June 1936, by Calkins Dam and powerplant, 4.0 mi (6.4 km) upstream from station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years, 1,398 ft^3/s (39.59 m^3/s), 11.87 in/yr (301 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,500 ft^3/s (496 m^3/s) Apr. 11, 1947, gage height, 606.76 ft (184.940 m), site and datum then in use; minimum daily, 50 ft^3/s (1.42 m^3/s) Aug. 19, 1976, caused by shutting off flow at Calkins Dam.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,290 ft^3/s (121 m^3/s) June 9, gage height, 11.83 ft (3.606 m); minimum, 398 ft^3/s (11.3 m^3/s) Oct. 20, gage height, 4.89 ft (1.490 m); minimum daily, 428 ft^3/s (12.1 m^3/s) Oct. 20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	735	1280	2010	2480	1300	1600	2250	1850	1850	1090	1990	1210
2	808	1190	2060	2330	1300	1240	2410	1880	1640	1090	1360	1680
3	798	963	1990	2080	1300	1290	2490	1840	1400	1080	1800	2140
4	816	1280	1930	2010	1270	1300	2670	1800	1990	1080	3030	1970
5	856	1310	1930	1880	1170	1300	2440	1800	2270	1090	3020	1460
6	940	1120	1880	1760	1170	1550	2420	1780	2380	1530	2160	1420
7	924	1090	1820	1750	1210	1750	2410	1730	2350	1490	2110	2030
8	1010	1310	1930	1440	1480	1340	2530	1220	3190	1070	2240	1940
9	972	1310	1930	1070	1720	876	3180	1340	4030	1390	2390	683
10	1000	1140	1930	1320	1180	1300	3150	1680	3100	1880	2080	1540
11	1030	1060	1870	1820	872	1720	3550	1110	2500	1670	1940	2130
12	1120	1300	1710	2010	1260	1400	3090	1110	2390	1070	1810	1560
13	1240	1150	1820	1750	1630	1100	3030	1510	2240	1650	1220	1100
14	1170	866	1930	1860	1190	1120	2960	1830	2220	2050	1320	1470
15	924	1060	1840	1700	960	1430	2860	1730	2310	1620	1650	1850
16	539	1320	1690	1720	1190	1720	2880	1710	2560	1490	1650	1510
17	447	1320	1770	1890	1160	1720	2860	1720	2830	1900	1660	1370
18	481	1320	1460	2040	1150	2290	2520	1750	2590	1890	1660	1900
19	450	1120	1000	1990	1210	2390	2470	1830	2480	1620	1650	1950
20	428	886	1300	1850	1280	2510	2460	1950	2410	1120	1880	2300
21	474	1400	1320	1690	1290	2890	2350	1990	2200	2160	2340	2400
22	502	1900	1340	1690	1670	2950	2070	2020	2050	2110	2610	2200
23	485	1840	1660	1690	2110	3180	2000	2010	1840	2310	2690	2050
24	475	1620	2000	1690	2380	3000	1920	1940	1170	2070	2430	2090
25	432	1720	2390	1680	2250	2850	1580	1960	1570	1660	1940	2150
26	731	1920	3190	1620	2050	2820	1510	1920	1970	1200	1540	2150
27	1260	2520	3210	1560	1990	2670	1930	1530	1550	1230	2090	2130
28	1300	2990	2740	1230	1930	2440	1940	1100	1090	1300	1890	1980
29	1250	2620	2820	1010	1920	2420	1890	1060	1090	1280	1900	1650
30	1090	2240	2650	1230	---	2380	1870	1420	1090	1280	1930	1900
31	989	---	2590	1290	---	2260	---	1700	---	1640	1710	---
TOTAL	25676	44165	61710	53130	42592	60806	73690	51820	64350	47110	61690	53913
MEAN	828	1472	1991	1714	1469	1961	2456	1672	2145	1520	1990	1797
MAX	1300	2990	3210	2480	2380	3180	3550	2020	4030	2310	3030	2400
MIN	428	866	1000	1010	872	876	1510	1060	1090	1070	1220	683
CFSM	.52	.92	1.24	1.07	.92	1.23	1.54	1.05	1.34	.95	1.24	1.12
IN.	.60	1.03	1.43	1.24	.99	1.41	1.71	1.20	1.50	1.10	1.43	1.25

CAL YR 1979 TOTAL 612330 MEAN 1678 MAX 5730 MIN 428 CFSM 1.05 IN 14.24
WTR YR 1980 TOTAL 640652 MEAN 1750 MAX 4030 MIN 428 CFSM 1.09 IN 14.90

04108600 RABBIT RIVER NEAR HOPKINS, MI

LOCATION.--Lat 42°38'32", long 85°43'19", in SE¼ sec.16, T.3 N., R.12 W., Allegan County, Hydrologic Unit 04050003, on left bank at downstream side of bridge on 18th Street, 2.5 mi (4.0 km) northeast of Hopkins.

DRAINAGE AREA.--71.4 mi² (184.9 km²).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 10 ft).

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 56.6 ft³/s (1.603 m³/s), 10.77 in/yr (274 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) June 26, 1978, gage height, 9.56 ft (2.914 m); minimum not determined; minimum daily, 9.2 ft³/s (0.26 m³/s) Aug. 27, 28, 1970, Sept. 18, 1971; minimum gage height, 1.89 ft (0.576 m) Aug. 28, 1977.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	0800	*460	13.0	*7.61	2.320	June 8	0600	409	11.6	7.48	2.280

Minimum discharge, 20 ft³/s (0.57 m³/s) Oct. 1, 2; minimum gage height, 2.31 ft (0.704 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	34	78	62	38	56	94	59	41	30	51	39
2	20	40	66	58	38	52	78	56	51	29	53	42
3	21	36	59	54	37	48	81	54	97	27	76	42
4	21	33	55	49	37	45	151	51	86	28	59	36
5	22	32	64	45	37	42	117	49	61	36	49	33
6	23	31	83	44	37	39	86	48	94	36	45	31
7	28	31	77	42	37	38	73	45	181	35	44	29
8	28	31	94	41	36	37	100	44	380	35	42	29
9	27	33	68	40	36	36	247	44	286	34	42	29
10	27	33	58	39	36	36	266	43	132	32	40	31
11	27	32	56	47	36	36	177	44	84	30	41	29
12	30	31	73	54	36	37	155	43	65	29	42	27
13	31	31	65	51	36	38	127	54	57	30	40	31
14	29	30	52	48	35	42	110	62	57	32	42	37
15	28	30	46	46	35	48	167	53	73	30	40	33
16	27	32	46	45	35	75	139	49	92	37	36	31
17	27	31	44	52	35	180	103	48	69	39	36	58
18	28	30	53	60	35	193	86	82	56	32	38	63
19	28	30	43	54	35	141	77	73	51	32	36	46
20	29	29	43	50	35	121	70	59	52	35	116	44
21	30	44	35	48	40	168	66	51	47	140	141	49
22	30	103	37	47	154	139	63	47	43	123	80	45
23	45	114	48	45	215	103	60	44	40	76	57	87
24	46	89	155	44	149	87	58	42	38	53	47	65
25	42	68	427	43	98	79	65	41	36	44	43	49
26	37	243	353	42	78	71	61	38	35	40	40	43
27	34	222	223	41	70	67	59	36	33	195	38	40
28	33	154	126	40	62	64	59	34	33	225	36	36
29	32	108	93	39	60	66	61	34	32	120	34	34
30	31	88	78	39	---	64	61	35	30	74	33	32
31	30	---	68	38	---	76	---	44	---	59	32	---
TOTAL	911	1873	2866	1447	1648	2324	3117	1506	2432	1797	1549	1220
MEAN	29.4	62.4	92.5	46.7	56.8	75.0	104	48.6	81.1	58.0	50.0	40.7
MAX	46	243	427	62	215	193	266	82	380	225	141	87
MIN	20	29	35	38	35	36	58	34	30	27	32	27
CFSM	.41	.87	1.30	.65	.80	1.05	1.46	.68	1.14	.81	.70	.57
IN.	.47	.98	1.49	.75	.86	1.21	1.62	.78	1.27	.94	.81	.64

CAL YR 1979 TOTAL 25717 MEAN 70.5 MAX 700 MIN 19 CFSM .99 IN 13.40
WTR YR 1980 TOTAL 22690 MEAN 62.0 MAX 427 MIN 20 CFSM .87 IN 11.82

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°38'50", long 86°11'53", in NE¼ sec.16, T.3 N., R.16 W., Allegan County, Hydrologic Unit 04050003, at bridge on Old US-31 between Saugatuck and Douglas, 7.9 mi (12.7 km) downstream from Rabbit River, 17.6 mi (28.3 km) downstream from gaging station near Fennville and 2.9 mi (4.7 km) upstream from mouth.

DRAINAGE AREA.--2,020 mi² (5,230 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to current year.
WATER TEMPERATURES: May 1975 to current year.

INSTRUMENTATION.--Water-quality monitor since Nov. 1, 1975.

REMARKS.--In addition to water-quality monitor, water temperature readings and specific conductance samples were collected by a local observer on an approximate twice-weekly basis. Interruptions in the daily record were due to malfunctions of the instrument. Water-discharge measurement made at time of sampling. Biological Data (Phytoplankton) is for the 1979-80 water years. Additional water-quality parameters, beyond those required for NASQAN, were sampled for this year in a cooperative program with Environmental Services Division, State of Michigan Department of Natural Resources.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and were analyzed by Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded (water years 1974-75, 1979-80), 747 micromhos Apr. 30, 1980; minimum recorded (water years 1974-75, 1978-79), 172 micromhos Sept. 18, 1978.
WATER TEMPERATURES: Maximum recorded (water years 1975, 1977-80), 31.5°C July 20, 1977; minimum (water years 1975, 1978-80), 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 28.0°C July 15, Aug. 28; minimum 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
OCT											
10...	1245	1460	575	8.1	10.0	9.6	87	20	--	87	240
NOV											
19...	1330	1490	630	8.2	8.0	10.6	91	60	K26	44	260
DEC											
26...	1430	3000	502	7.6	2.5	10.6	78	10	--	E330	230
JAN											
28...	1400	E1930	560	8.0	.5	12.6	88	18	K1300	250	260
MAR											
04...	1345	1500	560	8.0	1.0	13.9	101	45	80	K5	230
APR											
08...	1545	2450	510	7.7	11.0	9.7	91	36	K70	K50	230
MAY											
20...	1200	1800	575	7.6	17.5	--	--	38	120	--	240
JUN											
24...	1200	1900	500	7.5	22.0	9.8	117	46	--	23	240
JUL											
29...	1000	1870	454	7.4	24.0	8.4	100	32	--	--	220
AUG											
26...	0915	1960	489	7.9	25.0	--	--	56	100	640	250
SEP											
29...	1430	E2280	517	8.4	16.0	--	--	100	110	73	240

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)
OCT											
10...	23	60	21	--	26	27	.7	2.5	260	0	213
NOV											
19...	42	71	21	0	23	22	.6	2.2	270	0	221
DEC											
26...	54	61	18	--	18	20	.5	2.8	210	0	172
JAN											
28...	46	69	21	0	21	21	.6	1.9	260	0	213
MAR											
04...	31	60	19	0	19	15	.5	2.1	240	0	197
APR											
08...	53	64	18	--	15	12	.4	2.2	220	0	180
MAY											
20...	35	65	20	0	20	15	.6	1.8	250	0	205
JUN											
24...	38	66	17	2	16	13	.5	1.9	240	0	200
JUL											
29...	44	60	18	--	16	13	.5	2.2	240	0	180
AUG											
26...	60	67	20	0	15	11	.4	2.3	250	0	190
SEP											
29...	26	63	19	0	16	13	.5	2.2	260	6	223

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT										
10...	3.3	43	39	.3	4.9	345	329	1360	15	371
NOV										
19...	2.7	48	34	.2	7.3	363	343	1460	5	386
DEC										
26...	8.4	45	27	.2	7.7	321	288	2600	21	349
JAN										
28...	4.2	48	31	.2	8.5	356	334	--	4	372
MAR										
04...	3.8	42	33	.2	7.2	336	306	1360	4	351
APR										
08...	7.0	43	23	.2	5.2	305	286	2020	16	324
MAY										
20...	10	45	30	.2	1.8	352	309	1710	11	376
JUN										
24...	12	39	25	.2	5.9	327	292	1680	12	370
JUL										
29...	14	27	27	.2	8.8	318	270	1610	21	357
AUG										
26...	4.7	40	26	.3	9.6	322	297	1700	18	341
SEP										
29...	1.7	31	27	.2	5.4	332	300	--	26	381

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)
OCT										
10...	.83	.83	.190	.110	.23	.69	.88	1.7	7.6	.140
NOV										
19...	.87	.83	.170	.120	.21	1.0	1.2	2.1	9.2	.100
DEC										
26...	1.2	1.1	.250	.230	.30	.45	1.1	2.3	10	.080
JAN										
28...	1.1	1.1	.240	.240	.29	.53	.77	1.9	8.3	.060
MAR										
04...	1.1	1.1	.300	.210	.36	.59	.89	2.0	8.8	.070
APR										
08...	1.0	1.0	.160	.140	.19	.94	1.1	2.1	9.3	.110
MAY										
20...	.60	.44	.150	.120	.18	.77	.92	1.5	6.7	.110
JUN										
24...	.80	.70	.200	.010	.24	.75	.95	1.8	7.7	.100
JUL										
29...	.84	.62	.070	.010	.08	1.0	1.1	1.9	8.6	.180
AUG										
26...	.53	.50	.100	.040	.12	.67	.77	1.3	5.8	.120
SEP										
29...	.44	.45	.040	.010	.05	.95	.99	1.4	6.3	.130

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT										
10...	.43	.050	.020	.06	--	--	--	15	59	100
NOV										
19...	.31	.050	.010	.03	12.2	.000	6.7	12	48	100
DEC										
26...	.25	.050	.010	.03	2.31	.000	7.3	14	113	100
JAN										
29...	.18	.040	.010	.03	.670	.000	--	5	--	100
MAR										
04...	.21	.030	.010	.03	.730	.000	5.4	6	24	100
APR										
08...	.34	.030	.050	.15	11.9	.000	7.0	25	165	100
MAY										
20...	.34	.020	.010	.03	40.4	6.36	7.0	13	63	100
JUN										
24...	.31	.040	.010	.03	29.4	1.34	--	14	72	100
JUL										
29...	.55	.060	.030	.09	22.5	3.25	9.2	17	86	100
AUG										
26...	.37	.140	.020	.06	36.3	3.09	9.9	21	111	100
SEP										
29...	.40	.030	.010	.03	74.8	.000	--	22	--	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)
OCT												
10...	1245	2	2	100	60	--	2	20	<10	--	1	7
JAN												
28...	1400	4	3	200	70	0	0	230	20	3	2	7
JUN												
24...	1200	4	--	--	80	--	3	<10	10	0	0	5
SEP												
29...	1430	2	1	100	--	0	0	10	<10	0	0	3

DATE	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)
OCT											
10...	4	670	30	3	1	--	90	30	.2	.2	9
JAN											
28...	3	1500	30	5	0	--	70	40	.2	.1	120
JUN											
24...	3	480	20	3	0	--	80	5	.2	.2	3
SEP											
29...	3	600	40	4	0	0	80	10	.1	<.1	6

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	TI-TANIUM, DIS-SOLVED (UG/L AS TI)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT											
10...	6	0	0	0	--	20	0	11	1.7	--	--
JAN											
28...	4	0	0	0	--	320	30	6.1	.8	--	--
JUN											
24...	1	0	0	0	--	20	0	8.2	1.9	--	--
SEP											
29...	2	0	0	0	<5	20	10	6.4	1.9	.00	4

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	AROCLOR TOT. IN BOT MAT 1242 PCB SERIES (UG/KG)	AROCLOR TOT. IN BOT MAT 1248 PCB SERIES (UG/KG)	AROCLOR TOT. IN BOT MAT 1254 PCB SERIES (UG/KG)	AROCLOR TOT. IN BOT MAT 1260 PCB SERIES (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)
NOV 19...	1330	ND	ND	ND	4	ND	ND	ND	ND	ND	ND	ND
MAR 04...	1345	ND	--	--	--	--	ND	--	ND	--	ND	--

DATE	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIAZINON, TOTAL (UG/L)	DIAZINON, TOTAL IN BOTTOM MATERIAL (UG/KG)	DIELDRIN TOTAL (UG/L)	DIELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG)
NOV 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAR 04...	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--

DATE	HEPTACHLOR, TOTAL (UG/L)	HEPTACHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTACHLOR EPOXIDE TOTAL (UG/L)	HEPTACHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	MALATHION, TOTAL (UG/L)	MALATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	METHOXYCHLOR, TOTAL (UG/L)	METHOXYCHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARATHION, TOTAL (UG/L)	METHYL PARATHION, TOT. IN BOTTOM MATL. (UG/KG)
NOV 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAR 04...	ND	--	ND	--	ND	ND	--	--	--	ND	--

DATE	METHYL TRITHION, TOTAL (UG/L)	METHYL TRITHION, TOT. IN BOTTOM MATL. (UG/KG)	PARATHION, TOTAL (UG/L)	PARATHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOXAPHENE, TOTAL (UG/L)	TOXAPHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRITHION (UG/L)	TRITHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV 19...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAR 04...	ND	--	ND	--	ND	--	ND	--	--	--	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
NOV 19...	1330	40	18.3	1.02	1.34	17.5	4.87
MAR 04...	1345	36	102	1.18	1.65	4.62	.680
MAY 20...	1200	42	149	17.6	22.3	31.5	8.98
AUG 26...	0915	28	142	7.87	12.3	31.1	2.85

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 16,78		MAR 6,79		MAY 21,79		JUN 25,79		JUL 30,79	
TIME	1030		1700		1530		1400		1300	
TOTAL CELLS/ML	3400		3700		40000		25000		3300	
DIVERSITY: DIVISION	1.6		0.6		1.1		1.6		1.1	
.CLASS	1.7		0.6		1.1		1.6		1.1	
..ORDER	2.2		0.9		1.3		1.7		1.4	
...FAMILY	2.5		0.9		1.7		2.2		1.8	
....GENUS	3.0		0.9		2.4		2.9		2.6	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	17	1
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	1300	5	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	140	4
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	1600	4	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	160	5	29	1	1600	4	160	1	17	1
....CHLORELLA	22	1	--	-	--	-	--	-	--	-
....CHODATELLA	22	1	--	-	--	-	650	3	--	-
....DICTYOSPHAERIUM	--	-	--	-	9200#	23	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	160	1	17	1
....SELENASTRUM	--	-	--	-	--	-	1900	8	17	1
....TETRAEDRON	--	-	--	-	--	-	320	1	51	2
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	270	8
....SCENEDESMUS	240	7	120	3	2500	6	1900	8	620#	19
....TETRASTRUM	--	-	--	-	--	-	1300	5	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	1000	3	320	1	69	2
...PHACOTACEAE										
....PHACOTUS	22	1	--	-	--	-	--	-	--	-
....PTEROMONAS	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE	--	-	--	-	--	-	--	-	--	-
....CYCLOTELLA	1000#	31	--	-	6900#	17	7600#	31	1400#	43
....MELOSIRA	360	11	170	5	200	1	3200	13	460	14
....STEPHANODISCUS	--	-	--	-	16000#	40	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	89	3	--	-	--	-	--	-	--	-
....COCCONEIS	44	1	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	22	1	--	-	--	-	--	-	34	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	44	1	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	200	6	29	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	410	1	--	-	69	2
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...CHROMULINACEAE										
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	44	1	--	-	--	-	--	-	--	-
....OCHROMONAS	22	1	--	-	200	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108600 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 16,78		MAR 6,79		MAY 21,79		JUN 25,79		JUL 30,79	
TIME	1030		1700		1530		1400		1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	44	1	--	-	--	-	160	1	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	610	2	160	1	51	2
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	3100#	85	--	-	5600#	23	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	870#	26	170	5	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	22	1	--	-	--	-	--	-	--	-
....EUTREPTIA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	89	3	*	0	--	-	--	-	34	1
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	SEP 4,79	NOV 19,79	APR 8,80	MAY 20,80
TIME	1445	1330	1545	1200
TOTAL CELLS/ML	19000	5100	13000	40000
DIVERSITY: DIVISION	1.3	1.1	1.7	1.3
.CLASS	1.3	1.2	1.8	1.3
..ORDER	1.7	1.7	2.4	1.7
...FAMILY	2.9	2.0	2.9	2.0
....GENUS	3.7	0.0	3.4	2.2

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	39	1	--	-	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	490	3	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	1600	8	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	1200	6	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	190	1	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	970	5	120	2	150	1	860	2
....CHLORELLA	2000	11	--	-	300	2	--	-
....CHODATELLA	290	2	--	-	--	-	580	1
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	97	1	120	2	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	290	1
....TETRAEDRON	97	1	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	2100	11	310	6	670	5	5200	13
....TETRASTRUM	740	4	--	-	300	2	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	490	3	120	2	300	2	290	1
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
....PTEROMONAS	--	-	39	1	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE	--	-	700	14	--	-	--	-
....CYCLOTELLA	4400#	23	1300#	25	2800#	22	24000#	59
....MELOSIRA	2200	12	390	8	1100	9	580	1
....STEPHANODISCUS	--	-	1100#	20	74	1	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	150	1	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	310	6	300	2	860	2
....FRAGILARIA	490	3	--	-	--	-	--	-
....SYNEDRA	97	1	--	-	520	4	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	300	2	--	-
...NAVICULACEAE								
....NAVICULA	--	-	39	1	1100	9	290	1
...NITZSCHIACEAE								
....NITZSCHIA	190	1	120	2	220	2	2000	5
...SURIRELLACEAE								
....SURIRELLA	97	1	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	--	-	39	1	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	190	1	--	-	300	2	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	SEP 4,79		NOV 19,79		APR 8,80		MAY 20,80	
TIME	1445		1330		1545		1200	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	97	1	190	4	--	-	1700	4
...CRYPTOMONADACEAE								
....CRYPTOMONAS	290	2	120	2	--	-	860	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	190	1	160	3	--	-	2600	7
..HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	2900#	23	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	220	2	--	-
....EUTREPTIA	97	1	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	1100	9	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	97	1	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 24,80		JUL 29,80		AUG 26,80		SEP 29,80	
TIME	1200		1000		0915		1430	
TOTAL CELLS/ML	18000		25000		37000		7900	
DIVERSITY: DIVISION	1.7		1.6		1.6		1.1	
.CLASS	1.7		1.6		1.6		1.1	
..ORDER	2.1		2.1		1.9		1.2	
...FAMILY	2.3		2.6		2.0		1.4	
....GENUS	2.3		2.8		2.7		1.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	3200	13	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	*	0	*	0	120	2
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	140	1	200	1	--	-	--	-
....DICTYOSPHAERIUM	--	-	4400#	18	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	400	2	600	2	59	1
....TETRAEDRON	--	-	--	-	*	0	59	1
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	1200	3	--	-
....CRUCIGENIA	--	-	--	-	1200	3	--	-
....SCENEDESMUS	1700	9	400	2	1500	4	770	10
....TETRASTRUM	--	-	400	2	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	*	0	--	-	--	-
....CHLAMYDOMONAS	970	5	1000	4	300	1	240	3
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
....PTEROMONAS	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE	--	-	--	-	--	-	--	-
....CYCLOTELLA	9900#	55	9400#	38	6000#	16	5000#	63
....MELOSIRA	--	-	--	-	9500#	25	940	12
....STEPHANODISCUS	--	-	--	-	740	2	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	140	1	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	140	1	--	-	*	0	59	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	280	2	800	3	450	1	--	-
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...CHROMULINACEAE								
....CHRYSOCOCCUS	--	-	--	-	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 24,80 1200		JUL 29,80 1000		AUG 26,80 0915		SEP 29,80 1430	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	1100	6	--	-	--	-	300	4
...CRYPTOMONADACEAE								
....CRYPTOMONAS	700	4	300	1	450	1	300	4
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	1600	7	--	-	--	-
....ANACYSTIS	420	2	300	1	1200	3	59	1
..HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	2200	13	--	-	--	-	--	-
....OSCILLATORIA	--	-	2000	8	13000#	36	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	*	0	--	-
....EUTREPTIA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	140	1	--	-	*	0	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	*	0	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	571	558	564	---	---	---	484	481	482	464	447	454
2	573	557	569	---	---	---	504	489	497	478	468	473
3	578	560	574	---	---	---	518	508	514	485	478	481
4	581	568	576	---	---	---	545	527	535	495	483	489
5	579	566	576	---	---	---	551	543	546	500	489	495
6	580	574	577	---	---	---	556	548	554	515	504	510
7	581	572	578	---	---	---	563	482	541	529	511	521
8	586	581	583	---	---	---	498	464	476	536	522	529
9	588	571	584	---	---	---	487	477	482	552	537	541
10	575	562	570	---	---	---	495	484	487	551	535	546
11	572	560	566	---	---	---	501	488	493	541	510	528
12	573	534	558	---	---	---	509	486	493	562	543	549
13	534	512	517	---	---	---	499	481	491	589	564	574
14	526	519	524	---	---	---	504	497	500	573	561	569
15	543	535	537	---	---	---	510	501	504	582	568	576
16	560	545	551	---	---	---	514	496	503	591	558	576
17	558	545	554	---	---	---	515	503	509	579	562	567
18	---	---	---	---	---	---	528	519	522	590	566	578
19	---	---	---	---	---	---	533	522	526	594	585	590
20	---	---	---	---	---	---	537	524	530	591	573	583
21	---	---	---	---	---	---	539	528	531	584	572	577
22	---	---	---	---	---	---	538	529	533	588	498	571
23	---	---	---	---	---	---	539	525	532	553	541	546
24	---	---	---	---	---	---	538	531	534	565	555	560
25	---	---	---	---	---	---	536	503	513	582	551	567
26	---	---	---	---	---	---	510	457	496	574	564	569
27	---	---	---	---	---	---	497	436	465	580	574	576
28	---	---	---	520	516	518	451	409	429	585	574	578
29	---	---	---	525	499	514	427	406	414	586	574	582
30	---	---	---	506	480	490	439	421	428	583	575	581
31	---	---	---	---	---	---	445	428	435	589	575	583
MONTH							563	406	500	594	447	549

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	602	591	596	566	546	557	---	---	---	554	533	543
2	599	591	596	568	546	560	---	---	---	572	554	561
3	596	584	590	572	530	554	---	---	---	609	563	591
4	598	592	595	561	545	553	---	---	---	599	570	585
5	607	598	604	---	---	---	---	---	---	601	570	586
6	609	602	607	---	---	---	---	---	---	586	551	570
7	613	601	609	---	---	---	---	---	---	576	528	558
8	615	608	613	---	---	---	510	486	496	573	537	564
9	617	612	615	---	---	---	503	474	484	574	529	556
10	616	609	614	---	---	---	496	477	485	566	526	549
11	616	609	613	---	---	---	534	474	493	568	525	551
12	613	604	608	---	---	---	555	485	513	554	508	540
13	615	599	605	---	---	---	---	---	---	558	503	531
14	622	615	618	---	---	---	---	---	---	563	495	533
15	626	614	619	---	---	---	---	---	---	570	541	554
16	614	602	608	---	---	---	---	---	---	561	541	550
17	611	604	608	---	---	---	---	---	---	553	530	542
18	613	606	609	---	---	---	---	---	---	562	530	546
19	615	603	608	---	---	---	---	---	---	591	549	569
20	624	617	620	---	---	---	---	---	---	623	561	585
21	624	607	619	---	---	---	488	474	481	597	554	580
22	618	595	606	---	---	---	498	485	489	566	529	542
23	595	573	584	---	---	---	489	473	479	603	514	549
24	586	557	571	---	---	---	482	464	478	635	513	567
25	577	566	571	---	---	---	512	483	497	640	505	578
26	583	546	564	---	---	---	549	497	516	623	539	559
27	560	534	544	---	---	---	543	508	524	553	501	538
28	555	534	545	---	---	---	550	501	533	519	499	506
29	555	535	543	---	---	---	636	534	571	516	506	510
30	---	---	---	---	---	---	747	531	608	531	510	521
31	---	---	---	---	---	---	---	---	---	530	514	522
MONTH	626	534	597							640	495	553

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	532	513	519	505	497	502	---	---	---	487	474	481
2	531	510	517	509	499	503	---	---	---	483	474	479
3	525	499	510	509	502	505	---	---	---	491	483	487
4	531	507	517	527	511	517	---	---	---	502	491	497
5	533	502	519	562	524	540	---	---	---	508	501	505
6	512	499	506	614	562	586	---	---	---	507	500	504
7	513	483	498	627	615	620	---	---	---	518	506	512
8	515	446	484	651	615	637	---	---	---	535	519	525
9	468	447	459	688	648	670	---	---	---	575	537	558
10	481	452	470	685	674	683	---	---	---	---	---	---
11	452	423	436	672	620	649	---	---	---	---	---	---
12	433	421	424	614	578	601	---	---	---	---	---	---
13	447	432	439	575	560	569	---	---	---	---	---	---
14	457	444	451	575	563	568	---	---	---	---	---	---
15	458	443	447	576	546	559	---	---	---	---	---	---
16	465	450	455	543	515	525	---	---	---	---	---	---
17	475	458	466	512	498	503	---	---	---	---	---	---
18	486	471	478	500	498	500	---	---	---	---	---	---
19	489	471	480	500	492	496	---	---	---	---	---	---
20	498	471	482	499	490	493	---	---	---	---	---	---
21	490	470	482	497	471	484	---	---	---	---	---	---
22	493	480	486	466	461	465	---	---	---	---	---	---
23	505	495	500	456	450	453	---	---	---	---	---	---
24	522	505	513	451	426	438	---	---	---	---	---	---
25	515	511	512	434	422	425	---	---	---	---	---	---
26	523	510	514	444	433	440	---	---	---	---	---	---
27	522	518	519	437	431	435	510	499	504	---	---	---
28	522	513	517	441	432	437	507	493	501	---	---	---
29	522	509	514	454	436	445	506	497	502	---	---	---
30	512	502	507	---	---	---	504	489	498	520	510	516
31	---	---	---	---	---	---	494	484	490	---	---	---
MONTH	533	421	487									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	18.0	18.5	14.5	10.5	12.5	1.5	.0	1.0	2.5	2.0	2.5
2	18.5	17.5	17.5	10.5	8.5	9.0	1.5	.0	.5	2.5	2.0	2.0
3	17.5	16.5	17.0	9.0	8.0	8.5	.5	.0	.0	2.0	1.0	1.5
4	16.5	15.0	15.5	10.0	7.5	8.5	2.0	.0	.5	1.0	.5	1.0
5	15.0	14.0	14.0	10.0	7.5	9.0	4.0	1.0	2.5	1.5	.0	.5
6	14.0	12.5	13.5	9.0	8.5	9.0	2.5	1.5	2.0	.5	.0	.0
7	13.5	12.0	12.5	8.5	6.0	7.5	2.0	1.5	2.0	.0	.0	.0
8	12.0	11.0	11.5	8.0	6.0	7.0	1.5	.0	.5	.0	.0	.0
9	12.0	11.0	11.5	7.0	5.0	6.0	2.0	.0	1.0	.0	.0	.0
10	11.0	10.0	10.5	6.0	5.5	5.5	3.5	.5	2.0	.0	.0	.0
11	10.0	9.0	9.5	6.0	4.5	5.5	5.5	3.0	4.0	.5	.0	.0
12	9.5	8.5	9.0	6.5	4.5	5.5	5.0	2.0	4.0	.5	.0	.0
13	8.5	7.5	7.5	6.0	5.0	5.5	2.0	1.0	1.5	.5	.0	.0
14	9.5	7.0	8.0	5.5	4.5	5.0	1.5	.0	.5	.5	.0	.0
15	9.5	7.5	8.5	5.5	5.5	5.5	1.5	.0	.5	.5	.0	.0
16	10.5	9.0	9.5	6.0	4.5	5.5	1.5	.0	1.0	.5	.0	.0
17	11.5	10.5	11.0	8.5	5.5	6.5	.5	.0	.0	1.5	.5	1.0
18	13.0	11.5	12.5	10.0	7.0	8.0	.0	.0	.0	2.0	1.0	1.5
19	15.0	13.5	14.0	10.5	8.5	9.0	1.0	.0	.0	1.5	1.0	1.5
20	16.5	14.5	15.5	9.0	8.5	8.5	.5	.0	.0	2.0	.0	1.0
21	18.5	16.5	18.0	9.0	8.0	8.5	.0	.0	.0	1.5	.0	.5
22	19.5	18.5	19.0	10.5	9.5	10.0	1.0	.0	.5	1.0	.0	1.0
23	18.0	13.0	15.5	10.0	8.0	9.0	3.0	1.0	2.0	.0	.0	.0
24	12.5	10.0	11.0	8.5	6.5	7.5	4.5	3.0	4.0	.0	.0	.0
25	11.0	9.0	10.0	7.5	7.0	7.5	4.0	3.0	3.5	.0	.0	.0
26	10.0	8.5	9.5	7.5	7.5	7.5	2.5	2.5	2.5	.0	.0	.0
27	10.0	8.0	9.0	7.5	6.0	6.5	3.0	2.5	2.5	.0	.0	.0
28	12.0	10.0	10.5	6.5	1.5	4.5	3.0	2.0	2.5	.0	.0	.0
29	11.5	9.5	10.5	2.0	1.0	1.5	4.0	1.5	2.5	.0	.0	.0
30	12.0	9.5	10.5	1.0	.5	.5	3.5	2.0	2.5	.0	.0	.0
31	14.5	10.0	12.0	---	---	---	3.0	2.0	2.5	1.0	.0	.0
MONTH	19.5	7.0	12.5	14.5	.5	7.0	5.5	.0	1.5	2.5	.0	.5

04108690 KALAMAZOO RIVER AT SAUGATUCK, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.0	1.0	.0	.5	---	---	---	14.0	11.0	12.5
2	.0	.0	.0	1.0	.0	.5	---	---	---	16.0	12.0	14.0
3	.5	.0	.0	1.5	.0	.5	---	---	---	17.5	13.5	16.0
4	.5	.0	.0	1.0	.0	.5	---	---	---	19.5	14.5	17.0
5	.0	.0	.0	---	---	---	---	---	---	20.5	15.5	18.0
6	.5	.0	.0	---	---	---	---	---	---	20.0	16.0	18.0
7	.5	.0	.0	---	---	---	---	---	---	17.5	15.0	16.5
8	.5	.0	.0	---	---	---	11.5	9.5	11.0	17.0	14.5	15.5
9	.0	.0	.0	---	---	---	9.5	7.0	8.0	17.5	13.5	15.5
10	.0	.0	.0	---	---	---	7.0	6.5	6.5	16.5	14.0	15.0
11	.0	.0	.0	---	---	---	8.0	5.5	7.0	17.0	14.0	15.5
12	.5	.0	.0	---	---	---	8.5	6.5	7.0	17.0	15.0	16.0
13	.5	.0	.0	---	---	---	9.5	5.5	7.5	17.0	15.5	16.5
14	.0	.0	.0	---	---	---	7.5	5.5	6.0	17.5	13.0	15.5
15	.5	.0	.0	---	---	---	7.0	5.0	5.5	18.0	14.5	16.5
16	.0	.0	.0	---	---	---	9.0	4.0	6.5	17.0	15.0	16.0
17	.0	.0	.0	---	---	---	10.0	5.5	8.0	16.0	12.5	15.0
18	.0	.0	.0	---	---	---	13.0	7.0	10.0	15.5	14.5	15.0
19	.5	.0	.0	---	---	---	15.0	9.5	12.5	18.0	14.0	16.0
20	1.0	.5	1.0	---	---	---	15.5	11.5	13.5	20.0	15.5	18.0
21	2.0	1.0	1.5	---	---	---	16.5	13.0	14.5	20.5	17.0	19.0
22	2.0	1.0	1.5	---	---	---	18.5	13.0	15.5	22.0	17.5	19.5
23	1.5	1.0	1.5	---	---	---	17.0	14.0	16.0	21.5	19.0	20.5
24	1.5	.0	.5	---	---	---	14.5	9.5	12.0	22.0	18.0	20.5
25	1.0	.5	.5	---	---	---	14.5	9.0	11.5	22.0	16.0	19.5
26	.5	.0	.0	---	---	---	13.0	11.0	12.0	22.5	18.5	20.5
27	1.0	.0	.5	---	---	---	13.0	11.0	12.0	22.0	18.5	20.5
28	1.0	.0	.5	---	---	---	13.0	10.5	12.0	23.0	20.0	21.5
29	1.0	.0	.5	---	---	---	13.0	11.5	12.5	23.0	21.0	22.0
30	---	---	---	---	---	---	13.5	12.0	12.5	23.5	21.0	22.0
31	---	---	---	---	---	---	---	---	---	24.0	20.5	22.0
MONTH	2.0	.0	.5							24.0	11.0	17.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	22.5	19.0	20.5	23.5	21.5	22.5	25.5	23.0	24.5	25.0	23.5	24.5
2	21.0	18.0	19.5	24.0	21.5	23.0	25.0	23.5	24.0	25.0	23.5	24.5
3	23.0	19.5	21.0	24.5	21.5	23.0	25.0	22.5	23.5	25.0	22.5	24.0
4	22.5	19.0	21.0	24.0	22.5	23.0	25.5	23.0	24.5	25.0	22.5	24.0
5	21.0	19.0	20.0	24.0	22.0	23.0	25.5	24.0	24.5	25.0	22.5	24.0
6	21.5	19.0	20.5	24.5	22.0	23.5	25.0	23.5	24.0	24.5	22.5	23.5
7	22.0	19.0	20.5	25.5	22.0	24.0	25.5	23.0	24.0	23.5	21.5	22.5
8	20.0	16.5	18.5	26.5	24.0	25.5	26.5	24.0	25.0	24.5	21.5	23.0
9	20.0	16.0	17.5	26.0	23.5	25.0	26.0	24.5	25.5	24.0	23.5	23.5
10	19.5	15.5	17.5	26.5	23.5	24.5	25.5	24.5	25.0	---	---	---
11	20.0	15.5	17.5	25.5	24.0	25.0	24.5	23.5	24.0	---	---	---
12	20.5	16.5	18.5	24.5	23.5	24.0	25.0	23.0	24.0	---	---	---
13	21.0	17.5	19.5	26.0	23.0	24.0	24.0	22.5	23.0	---	---	---
14	21.5	20.0	20.5	27.0	24.0	25.5	24.5	22.5	23.0	---	---	---
15	21.0	19.0	20.0	28.0	25.5	26.5	24.5	22.0	23.5	---	---	---
16	20.5	17.0	19.0	27.5	25.5	26.5	23.5	21.0	22.0	---	---	---
17	20.5	17.0	19.0	27.0	24.5	26.0	21.5	20.5	21.0	---	---	---
18	20.5	17.5	19.5	25.5	24.5	25.0	23.5	20.5	22.0	---	---	---
19	20.0	17.0	19.0	26.0	24.0	25.0	23.5	21.5	22.5	---	---	---
20	20.5	18.0	19.0	27.5	25.0	26.0	26.0	22.5	24.0	---	---	---
21	21.0	18.0	19.5	26.5	25.0	25.5	26.0	24.5	25.0	---	---	---
22	22.5	19.5	21.0	26.0	24.0	25.0	25.5	24.0	24.5	---	---	---
23	23.5	20.5	22.0	25.5	23.0	24.5	25.0	22.5	23.5	---	---	---
24	24.5	22.0	23.0	25.0	23.0	24.0	25.0	22.5	24.0	---	---	---
25	25.5	23.0	24.0	25.0	23.0	24.0	25.0	23.5	24.0	---	---	---
26	26.0	24.0	25.0	24.5	23.5	24.0	25.5	23.0	24.0	---	---	---
27	25.5	23.5	24.5	23.5	23.0	23.0	26.0	23.5	25.0	---	---	---
28	26.0	23.0	24.5	24.5	22.5	23.5	28.0	24.0	25.5	---	---	---
29	25.5	23.5	24.5	24.5	23.0	24.0	27.0	25.0	26.0	---	---	---
30	24.0	21.0	23.0	23.5	22.0	22.5	26.5	25.0	26.0	18.5	16.0	17.5
31	---	---	---	24.5	21.5	23.0	25.5	24.5	25.0	---	---	---
MONTH	26.0	15.5	20.5	28.0	21.5	24.5	28.0	20.5	24.0			

04108800 MACATAWA RIVER NEAR ZEELAND, MI

LOCATION.--Lat 42°46'40", long 86°01'06", in NW¼ sec.31, T.5 N., R.14 W., Ottawa County, Hydrologic Unit 04050002, on left bank 20 ft (6 m) upstream from bridge on State Road, 0.2 mi (0.3 km) downstream from South Branch, and 2.5 mi (4.0 km) south of Zeeland.

DRAINAGE AREA.--65.8 mi^2 (170.4 km^2).

PERIOD OF RECORD.--October 1960 to current year. Prior to October 1978, published as Black River near Zeeland.

GAGE.--Water-stage recorder. Datum of gage is 585.7 ft (178.52 m) National Geodetic Vertical Datum of 1929 (levels by Gove Associates, Inc.).

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years, 63.4 ft^3/s (1.795 m^3/s), 13.08 in/yr (332 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,180 ft^3/s (118 m^3/s) Mar. 4, 1979, gage height, 14.06 ft (4.285 m); minimum, 0.9 ft^3/s (0.025 m^3/s) Aug. 24, 1962; minimum gage height, 1.79 ft (0.546 m) Sept. 30, Oct. 3, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft^3/s (25.5 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 25	0800	1,940	54.9	11.86	3.615	June 7	2100	*3,310	93.7	*13.26	4.042

Minimum discharge, 4.8 ft^3/s (0.14 m^3/s) Sept. 7, 8, 9; minimum gage height, 1.97 ft (0.600 m) Oct. 1, 2, Sept. 7, 8, 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	12	86	54	21	31	86	26	15	11	9.1	7.4
2	5.6	12	73	49	20	23	50	23	22	10	15	7.0
3	5.8	10	54	41	19	20	62	22	359	9.1	21	6.1
4	5.8	9.3	40	31	19	18	500	20	115	8.7	16	5.7
5	6.0	8.8	164	26	19	18	146	19	90	15	11	5.4
6	6.8	8.8	192	24	18	18	62	18	463	13	10	5.4
7	8.5	8.6	163	22	17	16	41	16	1260	9.6	10	5.1
8	7.2	9.4	230	21	18	16	165	16	1690	8.3	13	5.1
9	6.8	9.8	85	20	16	20	788	16	685	7.9	15	6.1
10	7.0	9.6	78	20	16	25	638	16	207	8.3	10	5.7
11	7.2	9.3	81	321	16	33	183	17	63	7.4	9.6	5.4
12	8.0	8.9	126	233	16	30	385	17	38	22	10	5.7
13	9.1	9.0	70	99	15	24	138	27	30	68	9.1	6.6
14	8.0	9.1	34	48	14	18	111	28	439	19	8.7	6.1
15	7.5	9.9	25	39	15	25	374	23	487	13	7.9	5.7
16	7.2	11	23	112	15	106	145	21	212	111	7.0	6.1
17	8.0	10	27	694	15	452	69	21	72	85	7.0	38
18	7.5	9.6	24	427	14	301	49	106	40	23	7.0	25
19	7.5	9.3	16	132	14	141	39	55	33	17	6.6	14
20	7.8	9.1	19	74	17	138	32	31	33	23	86	13
21	8.2	53	13	48	31	170	28	23	25	201	46	15
22	7.8	201	17	42	451	78	25	19	21	89	18	78
23	12	180	77	37	733	58	23	16	19	29	11	320
24	23	84	557	39	454	62	23	15	17	18	8.7	69
25	18	43	1690	34	157	70	26	33	16	14	7.9	32
26	12	571	1010	33	86	43	23	15	15	13	7.4	42
27	10	430	413	25	54	36	22	11	14	28	6.6	26
28	9.7	226	134	25	38	32	23	10	13	21	6.1	18
29	9.0	116	91	25	43	29	29	9.6	13	14	6.1	15
30	8.5	87	74	24	---	26	30	10	11	12	5.7	13
31	8.2	---	65	23	---	52	---	21	---	10	6.1	---
TOTAL	269.2	2184.5	5751	2842	2381	2129	4315	720.6	6517	938.3	418.6	812.6
MEAN	8.68	72.8	186	91.7	82.1	68.7	144	23.2	217	30.3	13.5	27.1
MAX	23	571	1690	694	733	452	788	106	1690	201	86	320
MIN	5.5	8.6	13	20	14	16	22	9.6	11	7.4	5.7	5.1
CFSM	.13	1.11	2.83	1.39	1.25	1.04	2.19	.35	3.30	.46	.21	.41
IN.	.15	1.23	3.25	1.61	1.35	1.20	2.44	.41	3.68	.53	.24	.46

CAL YR 1979 TOTAL 33227.6 MEAN 91.0 MAX 3380 MIN 5.3 CFSM 1.38 IN 18.78
WTR YR 1980 TOTAL 29278.8 MEAN 80.0 MAX 1690 MIN 5.1 CFSM 1.22 IN 16.55

04109000 GRAND RIVER AT JACKSON, MI

LOCATION.--Lat 42°17'05", long 84°24'30", in sec.22, T.2 S., R.1 W., Jackson County, Hydrologic Unit 04050004, on left bank of sewage-treatment plant, 1 mi (2 km) north of Jackson, 2.2 mi (3.5 km) upstream from Portage River, and at mile 216 (348 km).

DRAINAGE AREA.--174 mi² (451 km²).

PERIOD OF RECORD.--April 1935 to current year.

REVISED RECORDS.--WSP 974: 1937(M). WSP 1387: 1936. WSP 1727: 1950(M).

GAGE.--Water-stage recorder. Datum of gage is 900.00 ft (274.320 m) Fargo Engineering Co. datum. Prior to Sept. 24, 1935, nonrecording gage at same site and datum.

REMARKS.--Records good. Slight regulation by mills above station. Flow includes about 17 ft³/s (0.48 m³/s) as sewage effluent from the city of Jackson, which originates from ground water sources. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--45 years, 120 ft³/s (3.398 m³/s), 9.37 in/yr (238 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,070 ft³/s (30.3 m³/s) June 25, 1937, gage height, 13.50 ft (4.115 m); maximum gage height, 15.44 ft (4.706 m) June 25, 1968; minimum discharge, 9.2 ft³/s (0.26 m³/s) Aug. 22, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 546 ft³/s (15.5 m³/s) Apr. 3, gage height, 11.97 ft (3.648 m); minimum, 28 ft³/s (0.79 m³/s) Oct. 6, gage height, 8.29 ft (2.527 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	38	68	153	187	58	66	230	205	148	75	55	183
2	41	105	146	189	51	57	230	203	190	89	170	206
3	40	52	141	183	48	63	310	196	297	125	163	209
4	38	39	92	172	55	65	336	190	246	60	165	181
5	36	47	85	111	54	71	318	192	194	72	193	167
6	40	50	84	61	49	64	313	186	152	51	204	159
7	34	49	85	72	110	65	349	133	170	69	171	113
8	39	48	77	76	122	49	361	123	206	131	181	117
9	97	65	69	82	58	65	351	156	224	127	145	159
10	92	53	83	73	44	93	353	150	251	69	101	165
11	45	51	140	113	51	138	343	155	260	63	110	161
12	46	113	153	127	52	132	342	104	237	66	100	111
13	37	116	142	143	52	133	332	110	215	116	137	109
14	32	64	131	146	52	141	359	114	207	115	166	93
15	39	56	69	146	52	126	353	153	232	65	144	92
16	43	53	60	151	47	95	341	154	209	138	86	87
17	44	46	54	108	45	217	326	183	199	141	80	200
18	43	42	65	98	53	226	314	187	190	81	84	199
19	47	51	67	91	56	257	280	186	150	60	83	207
20	97	103	61	88	69	279	239	185	123	53	190	173
21	97	125	62	94	128	318	227	184	109	61	219	155
22	106	127	76	104	179	306	226	182	99	62	183	161
23	58	153	89	150	147	307	211	175	110	59	162	115
24	44	129	210	132	144	323	207	162	147	56	160	101
25	41	84	236	143	151	328	202	102	142	53	165	105
26	41	116	242	130	141	316	186	82	88	45	122	146
27	40	155	240	118	149	306	179	84	80	40	111	146
28	37	171	239	70	137	294	211	80	66	72	106	140
29	42	164	217	64	74	258	203	78	57	58	98	143
30	40	161	194	64	---	230	201	83	58	54	83	94
31	40	---	191	61	---	240	---	171	---	56	144	---
TOTAL	1554	2656	3953	3547	2428	5629	8433	4648	5056	2382	4281	4397
MEAN	50.1	88.5	128	114	83.7	182	281	150	169	76.8	138	147
MAX	106	171	242	189	179	328	361	205	297	141	219	209
MIN	32	39	54	61	44	49	179	78	57	40	55	87
CFSM	.29	.51	.74	.66	.48	1.05	1.62	.86	.97	.44	.79	.85
IN.	.33	.57	.85	.76	.52	1.20	1.80	.99	1.08	.51	.92	.94

CAL YR 1979 TOTAL 38456 MEAN 105 MAX 396 MIN 31 CFSM .60 IN 8.22
WTR YR 1980 TOTAL 48964 MEAN 134 MAX 361 MIN 32 CFSM .77 IN 10.47

04111000 GRAND RIVER NEAR EATON RAPIDS, MI

LOCATION.--Lat 42°32'05", long 84°37'25", in NE¼ sec.26, T.2 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on right bank 400 ft (122 m) upstream from bridge on Petrieville Highway, 2 mi (3 km) northeast of Eaton Rapids, 2.5 mi (4.0 km) downstream from Spring Brook, 25 mi (40 km) upstream from Red Cedar River, and at mile 178 (286 km).

DRAINAGE AREA.--661 mi² (1,712 km²).

PERIOD OF RECORD.--October 1950 to current year. Gage-height record for flood seasons collected in this vicinity 1905-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1707: 1951(M).

GAGE.--Water-stage recorder. Datum of gage is 852.68 ft (259.897 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation caused by powerplant at Smithville and mills at Eaton Rapids. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 455 ft³/s (12.89 m³/s), 9.35 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,500 ft³/s (99.1 m³/s) Feb. 21, 1971; maximum gage height, 8.19 ft (2.496 m) June 28, 1968; minimum discharge, 14 ft³/s (0.40 m³/s) Dec. 20, 1962, Oct. 14, 1966; minimum gage height, 0.67 ft (0.204 m) Dec. 20, 1962; minimum daily discharge, 21 ft³/s (0.59 m³/s) Oct. 12, 1964.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 4, 1950, reached a stage of 8.15 ft (2.484 m), discharge, 3,860 ft³/s (109 m³/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,520 ft³/s (43.0 m³/s) Mar. 20, gage height, 4.73 ft (1.442 m); minimum, 32 ft³/s (0.91 m³/s) Oct. 15, gage height, 0.91 ft (0.277 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	90	153	436	730	240	400	1060	868	412	205	158	475
2	120	181	412	693	230	330	1030	858	456	157	222	537
3	110	156	384	649	220	300	1070	803	593	176	486	577
4	90	212	343	600	210	260	1200	793	655	185	558	582
5	80	208	361	520	190	260	1310	733	682	243	539	587
6	120	179	365	450	180	230	1370	696	734	220	506	583
7	90	180	358	400	180	240	1330	658	743	231	460	551
8	130	142	348	350	180	250	1260	609	797	205	424	520
9	130	175	335	350	200	192	1250	584	708	217	392	500
10	90	175	320	300	210	258	1280	544	658	253	383	460
11	170	223	304	350	210	244	1290	517	619	252	357	434
12	206	224	316	450	210	246	1290	504	594	208	332	447
13	176	208	373	500	190	310	1260	510	582	200	304	441
14	131	223	371	477	175	290	1240	509	573	186	302	463
15	113	248	352	465	180	315	1290	488	584	243	287	429
16	125	201	341	437	190	332	1320	477	606	242	338	404
17	130	199	300	464	190	973	1310	477	575	251	320	497
18	125	166	230	512	188	1200	1250	633	551	301	289	613
19	141	195	210	511	186	1340	1170	689	546	294	263	629
20	156	190	250	483	197	1480	1090	703	531	282	384	632
21	141	221	243	445	202	1460	1030	702	482	159	638	634
22	183	281	250	427	395	1390	941	668	444	163	698	652
23	231	303	268	415	613	1310	900	630	376	170	717	743
24	225	364	361	350	660	1240	877	587	343	168	696	692
25	220	399	604	300	583	1190	864	547	340	167	658	620
26	202	413	696	340	546	1150	862	506	325	148	609	565
27	154	422	726	340	519	1100	849	446	314	140	565	516
28	138	435	835	340	500	1060	867	390	297	178	512	500
29	123	440	777	340	450	1080	879	346	246	216	461	465
30	148	442	788	300	---	1090	902	343	219	228	406	448
31	174	---	754	260	---	1080	---	375	---	260	409	---
TOTAL	4462	7558	13071	13548	8420	22700	33635	18193	15585	6548	13673	16196
MEAN	144	252	422	437	291	732	1121	587	520	211	441	540
MAX	231	442	835	730	660	1480	1370	868	797	301	717	743
MIN	80	142	210	260	175	192	849	343	219	140	158	404
CFSM	.22	.38	.64	.66	.44	1.11	1.70	.89	.79	.32	.67	.82
IN.	.25	.43	.74	.76	.47	1.28	1.89	1.02	.88	.37	.77	.91

CAL YR 1979 TOTAL 144016 MEAN 395 MAX 2240 MIN 65 CFSM .60 IN 8.10
WTR YR 1980 TOTAL 173595 MEAN 474 MAX 1480 MIN 80 CFSM .72 IN 9.77

04111379 RED CEDAR RIVER NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'58", long 84°13'09", in NE¼ sec.4, T.3 N., R.2 E., Ingham County, Hydrologic Unit 04050004, on right bank 20 ft (6 m) upstream from bridge on State Highway 52, 1.5 mi (2.4 km) upstream from Squaw Creek, and 3.5 mi (5.6 km) east of Williamston.

DRAINAGE AREA.--163 mi² (422 km²).

PERIOD OF RECORD.--July 1975 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 870 ft (265 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Oct. 13 to Nov. 13, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--5 years, 93.2 ft³/s (2.639 m³/s), 7.76 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 990 ft³/s (28.0 m³/s) Mar. 5, 6, 1976, gage height, 7.60 ft (2.316 m); minimum, 5.1 ft³/s (0.14 m³/s) Sept. 12, 1978, gage height, 2.03 ft (0.619 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1975, reached a gage height of 10.41 ft (3.173 m) Apr. 19, and a discharge of 2,640 ft³/s (74.8 m³/s) Apr. 20.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 458 ft³/s (13.0 m³/s) Mar. 21, gage height, 6.18 ft (1.884 m); minimum daily, 13 ft³/s (0.37 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	22	54	130	35	55	280	142	49	31	34	45
2	14	20	45	110	32	50	282	135	50	30	43	70
3	14	22	40	100	30	45	291	120	76	29	100	84
4	14	22	45	80	27	39	386	102	108	29	81	82
5	14	22	50	60	27	36	433	87	104	31	68	72
6	15	21	50	50	26	35	432	74	106	33	58	58
7	16	22	52	50	26	34	419	64	118	31	51	48
8	16	22	52	50	26	33	398	57	189	32	45	42
9	15	25	50	50	26	33	427	53	200	31	41	45
10	17	28	50	50	26	32	420	50	196	31	37	52
11	20	25	50	65	26	34	393	48	183	30	38	49
12	23	25	52	80	26	35	368	47	157	32	43	45
13	20	24	52	90	26	35	344	55	118	33	41	43
14	18	22	53	90	26	34	329	90	80	31	39	47
15	17	22	45	80	26	32	366	90	71	28	36	47
16	17	24	40	72	26	44	370	76	74	29	34	45
17	17	24	30	88	26	209	360	69	72	30	33	83
18	18	24	40	107	26	375	339	147	63	30	33	145
19	20	23	40	110	26	415	310	200	56	29	32	140
20	19	22	35	99	26	446	279	203	60	28	37	123
21	18	22	32	86	40	455	244	190	61	28	56	101
22	18	26	35	81	70	441	208	163	54	28	91	86
23	20	39	40	65	180	406	171	121	48	28	89	167
24	18	51	76	45	190	373	136	83	44	27	77	204
25	16	55	181	60	150	353	117	66	41	25	61	201
26	16	62	236	60	120	317	108	55	38	25	48	207
27	16	66	236	55	95	285	100	47	37	43	41	208
28	16	66	234	50	80	255	104	41	36	63	37	196
29	16	62	230	47	65	238	122	38	34	43	34	176
30	16	60	200	42	---	231	139	34	32	37	32	143
31	17	---	160	40	---	241	---	46	---	36	32	---
TOTAL	524	970	2585	2242	1533	5646	8675	2793	2555	991	1522	3054
MEAN	16.9	32.3	83.4	72.3	52.9	182	289	90.1	85.2	32.0	49.1	102
MAX	23	66	236	130	190	455	433	203	200	63	100	208
MIN	13	20	30	40	26	32	100	34	32	25	32	42
CFSM	.10	.20	.51	.44	.33	1.12	1.77	.55	.52	.20	.30	.63
IN.	.12	.22	.59	.51	.35	1.29	1.98	.64	.58	.23	.35	.70

CAL YR 1979 TOTAL 28162 MEAN 77.2 MAX 860 MIN 13 CFSM .47 IN 6.43
WTR YR 1980 TOTAL 33090 MEAN 90.4 MAX 455 MIN 13 CFSM .56 IN 7.55

04111500 DEER CREEK NEAR DANSVILLE, MI

LOCATION.--Lat 42°36'30", long 84°19'15", in E½ sec.33, T.3 N., R.1 E., Ingham County, Hydrologic Unit 04050004, on right bank 15 ft (5 m) upstream from bridge on Clark Road, 3.5 mi (5.6 km) north of Dansville, and 7.2 mi (11.6 km) upstream from mouth.

DRAINAGE AREA.--16.3 mi² (42.2 km²).

PERIOD OF RECORD.--May 1954 to current year.

REVISED RECORDS.--WSP 1727: 1954(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 889.08 ft (270.992 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Aug. 13 to Sept. 30, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 10.3 ft³/s (0.292 m³/s), 8.58 in/yr (218 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 962 ft³/s (27.2 m³/s) Apr. 19, 1975, gage height, 12.18 ft (3.712 m), from flood mark, rating curve extended above 610 ft³/s (17.3 m³/s); minimum, 0.04 ft³/s (0.001 m³/s) Sept. 8, 9, 12, 1978, gage height, 2.58 ft (0.786 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	1500	*216	6.12	*6.05	1.844	Aug. 21	unknown	125	3.54	unknown	
Apr. 4	0400	140	3.96	4.95	1.509	Sep. 25	unknown	115	3.26	unknown	
June 7	2300	131	3.71	4.82	1.469						

Minimum discharge, 0.22 ft³/s (0.006 m³/s) Oct. 1, gage height, 2.66 ft (0.811 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.25	.61	3.3	7.7	2.2	4.5	28	15	11	1.7	1.9	4.5
2	.27	.74	2.8	6.9	1.9	3.5	25	13	9.9	1.4	5.0	18
3	.30	.68	2.6	6.2	1.7	2.5	35	11	27	1.2	30	15
4	.40	.59	2.6	5.6	1.6	2.4	117	9.5	21	1.2	70	11
5	.35	.58	3.1	4.8	1.6	2.3	52	8.1	13	2.3	15	7.0
6	.35	.60	4.9	4.2	1.7	2.2	30	7.2	12	2.5	11	4.0
7	.40	.71	4.4	3.9	1.7	2.2	23	6.5	51	1.7	5.1	2.5
8	.40	.82	4.0	3.5	1.7	2.1	22	6.0	91	1.5	4.2	2.0
9	.34	.90	3.7	3.2	1.6	2.3	33	5.7	32	1.2	3.5	3.5
10	.27	1.2	3.2	3.2	1.5	3.0	34	5.5	20	1.3	2.9	5.0
11	.30	1.2	3.1	9.3	1.5	3.1	26	5.6	12	1.1	3.0	3.5
12	.43	1.1	4.0	11	1.6	3.0	23	5.3	9.1	1.0	3.9	2.7
13	.42	.94	4.4	7.4	1.7	2.7	20	6.7	8.8	1.0	3.3	2.7
14	.38	.82	3.5	6.3	1.7	2.8	28	8.9	8.0	.89	2.5	3.0
15	.35	.86	2.9	5.6	1.7	2.9	49	7.5	8.2	.79	2.0	2.5
16	.35	.98	2.4	5.5	1.7	27	31	6.6	12	1.1	1.5	2.3
17	.35	1.0	2.4	13	1.7	175	23	7.1	10	1.4	1.5	25
18	.38	.94	2.0	12	1.7	105	19	28	8.0	.96	1.7	20
19	.43	.91	2.0	9.9	1.7	41	17	22	7.2	.91	1.5	12
20	.46	.91	2.1	8.4	2.0	28	15	16	6.8	.91	10	8.0
21	.49	1.1	2.1	7.8	3.0	37	13	12	6.0	1.1	95	7.0
22	.48	1.7	2.7	6.5	51	30	11	9.0	5.0	1.4	85	15
23	.67	3.7	4.6	5.3	33	23	9.9	7.5	4.0	1.7	60	90
24	.73	4.8	15	4.4	19	23	9.0	6.6	3.2	1.6	25	45
25	.62	3.7	55	4.0	12	27	10	5.8	3.0	1.3	15	25
26	.55	5.2	28	3.4	9.0	19	10	4.7	2.8	1.5	10	15
27	.46	5.0	18	3.0	7.0	17	9.4	4.1	2.6	5.0	7.0	10
28	.46	4.5	14	3.0	6.0	17	13	3.7	2.4	14	6.0	8.0
29	.46	4.4	12	3.0	5.0	27	16	3.1	2.2	6.0	4.5	7.0
30	.46	3.8	10	2.7	---	24	17	3.5	1.9	4.0	3.5	6.0
31	.46	---	8.6	2.5	---	29	---	16	---	2.5	3.2	---
TOTAL	13.02	54.99	233.4	183.2	179.2	690.5	768.3	277.2	411.1	66.16	493.7	382.2
MEAN	.42	1.83	7.53	5.91	6.18	22.3	25.6	8.94	13.7	2.13	15.9	12.7
MAX	.73	5.2	55	13	51	175	117	28	91	14	95	90
MIN	.25	.58	2.0	2.5	1.5	2.1	9.0	3.1	1.9	.79	1.5	2.0
CFSM	.03	.11	.46	.36	.38	1.37	1.57	.55	.84	.13	.98	.78
IN.	.03	.13	.53	.42	.41	1.58	1.75	.63	.94	.15	1.13	.87

CAL YR 1979 TOTAL 3288.70 MEAN 9.01 MAX 302 MIN .09 CFSM .55 IN 7.51
WTR YR 1980 TOTAL 3752.97 MEAN 10.3 MAX 175 MIN .25 CFSM .63 IN 8.56

04112000 SLOAN CREEK NEAR WILLIAMSTON, MI

LOCATION.--Lat 42°40'33", long 84°21'50", in SE¼ NE¼ sec.1, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 30 ft (9 m) downstream from bridge on Meridian Road, 2.1 mi (3.4 km) upstream from mouth, and 4.2 mi (6.8 km) west of Williamston.

DRAINAGE AREA.--9.34 mi² (24.19 km²).

PERIOD OF RECORD.--June 1954 to current year.

GAGE.--Water-stage recorder and concrete control with V-notch sharp-crested weir. Datum of gage is 862.12 ft (262.774 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--26 years, 5.52 ft³/s (0.156 m³/s), 8.03 in/yr (204 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Apr. 18, 1975, gage height, 9.99 ft (3.045 m), from rating curve extended above 660 ft³/s (18.7 m³/s) on basis of computation of peak flow through culvert and over-road embankment; minimum, 0.01 ft³/s (<0.001 m³/s) Sept. 11, 1954, Jan. 18, 1957, gage height, 1.10 ft (0.335 m), caused by unusual regulation; minimum natural discharge, 0.02 ft³/s (0.001 m³/s) July 27, 1965, gage height, 1.18 ft (0.360 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 118 ft³/s (3.34 m³/s) Mar. 17, gage height, 3.79 ft (1.155 m), no peak above base of 120 ft³/s (3.40 m³/s); minimum, 0.07 ft³/s (0.002 m³/s) Oct. 1, 2, gage height 1.26 ft (0.384 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.07	.18	.90	2.4	.65	1.2	20	6.4	3.3	.80	.86	1.9
2	.08	.22	.78	2.1	.60	.95	15	5.4	3.0	.74	6.3	2.2
3	.09	.20	.69	1.8	.58	.90	23	4.7	18	.64	34	1.8
4	.09	.18	.66	1.5	.55	.85	62	4.0	12	.63	14	1.4
5	.09	.17	.84	1.4	.55	.85	29	3.3	6.6	.91	6.4	1.2
6	.10	.18	1.1	1.2	.59	.80	18	2.9	5.9	.88	4.1	1.0
7	.11	.22	.93	1.2	.59	.80	13	2.5	24	.64	2.9	.94
8	.10	.25	.87	1.1	.56	.80	12	2.2	37	.59	2.1	.86
9	.11	.30	.69	.90	.58	.80	23	2.0	18	.58	1.6	1.6
10	.11	.35	.63	.75	.60	.85	23	1.8	9.9	.59	1.3	2.4
11	.16	.35	.66	4.7	.60	1.0	15	1.8	6.5	.52	1.3	1.6
12	.14	.30	.90	5.7	.57	.90	13	1.6	4.7	.46	1.3	1.3
13	.12	.21	.94	3.0	.57	.85	10	2.4	3.9	.45	1.0	1.3
14	.11	.24	.71	2.3	.57	.85	17	3.9	3.6	.40	.95	1.4
15	.11	.32	.60	1.7	.59	.90	31	3.2	3.4	.36	.85	1.2
16	.11	.28	.58	1.6	.60	12	19	2.5	5.4	.75	.71	1.1
17	.13	.30	.46	4.2	.57	74	12	3.3	4.3	.76	.70	13
18	.12	.30	.40	4.0	.56	40	8.7	27	3.6	.51	.78	11
19	.13	.28	.43	3.3	.58	23	7.3	15	3.3	.44	.67	5.8
20	.14	.28	.43	2.6	.63	15	6.2	9.2	3.1	.39	44	4.2
21	.14	.40	.43	2.3	1.4	20	5.2	6.6	2.5	.58	45	3.4
22	.15	.44	.52	2.2	30	15	4.6	5.1	2.1	.78	37	7.8
23	.16	.72	.91	1.7	13	10	4.0	4.3	1.8	.80	16	44
24	.22	.69	6.3	1.3	6.3	12	3.5	3.6	1.5	.64	8.7	18
25	.18	.50	23	1.2	4.0	15	3.3	3.2	1.4	.60	5.7	10
26	.16	1.0	11	1.0	2.9	8.8	3.6	2.7	1.3	.71	4.0	6.5
27	.15	1.1	6.0	.90	2.2	7.8	3.5	2.3	1.1	6.7	3.1	4.9
28	.14	1.0	4.6	.85	1.6	7.6	4.2	2.0	1.1	3.4	2.4	4.0
29	.14	1.0	3.9	.80	1.4	11	6.3	1.8	.97	2.1	1.9	3.3
30	.14	.93	3.4	.75	---	10	7.6	1.7	.86	1.3	1.6	2.9
31	.14	---	2.9	.70	---	22	---	3.2	---	1.1	1.5	---
TOTAL	3.96	12.89	77.06	61.15	74.49	317.50	423.5	141.6	194.63	31.25	252.72	162.00
MEAN	.13	.43	2.49	1.97	2.57	10.2	14.1	4.57	6.49	1.01	8.15	5.40
MAX	.22	1.1	23	5.7	30	74	62	27	37	6.7	45	44
MIN	.07	.17	.40	.70	.55	.80	3.3	1.6	.86	.36	.67	.86
CFSM	.01	.05	.27	.21	.28	1.09	1.51	.49	.70	.11	.87	.58
IN.	.02	.05	.31	.24	.30	1.26	1.69	.56	.78	.12	1.01	.65

CAL YR 1979 TOTAL 1499.55 MEAN 4.11 MAX 228 MIN .05 CFSM .44 IN 5.97
WTR YR 1980 TOTAL 1752.85 MEAN 4.79 MAX 74 MIN .07 CFSM .51 IN 6.98

04112500 RED CEDAR RIVER AT EAST LANSING, MI

LOCATION.--Lat 42°43'40", long 84°28'40", in SW¼ sec.18, T.4 N., R.1 W., Ingham County, Hydrologic Unit 04050004, in left downstream bridge abutment of Farm Lane Bridge on Michigan State University Campus in East Lansing, 4.0 mi (6.4 km) upstream from Sycamore Creek, and 5.6 mi (9.0 km) upstream from mouth.

DRAINAGE AREA.--355 mi^2 (919 km^2).

PERIOD OF RECORD.--August 1902 to December 1903, March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Red Cedar River at Agricultural College, August 1902 to December 1903 and as Cedar River at East Lansing, March 1931 to September 1965. Gage height records collected in this vicinity 1911-19, and for flood seasons only 1920-28, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1936(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 824.39 ft (251.274 m) National Geodetic Vertical Datum of 1929. August 1902 to December 1903 nonrecording gage at site 0.8 mi (1.3 km) downstream at different datum. March 1931 to November 1940 water-stage recorder at site 250 ft (76 m) upstream at present datum.

REMARKS.--Records good. Occasional regulation at low flow by mill at Williamston, 16 mi (26 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 204 ft^3/s (5.777 m^3/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,940 ft^3/s (168 m^3/s) Apr. 20, 1975, gage height, 11.95 ft (3.642 m); minimum, 3 ft^3/s (0.08 m^3/s) July 31, 1931.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Mar. 24, 1904, reached a stage of 13.4 ft (4.08 m), discharge, 8,000 ft^3/s (277 m^3/s).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,090 ft^3/s (30.9 m^3/s) Mar. 19, gage height, 5.70 ft (1.737 m); minimum, 18 ft^3/s (0.51 m^3/s) Oct. 1, 2, gage height, 3.10 ft (0.945 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18	40	100	244	65	102	575	319	174	62	72	82
2	21	36	82	216	57	100	575	303	170	60	87	138
3	21	40	65	180	55	84	555	283	244	55	244	170
4	21	40	87	149	49	72	780	254	331	53	283	160
5	21	40	87	102	49	69	940	230	283	67	205	142
6	23	38	84	89	47	67	935	208	268	62	156	117
7	26	40	92	87	47	65	825	188	323	60	117	97
8	26	40	95	97	47	67	725	174	565	55	97	82
9	26	44	92	97	47	62	720	163	565	53	84	84
10	26	51	87	92	47	69	790	156	440	51	79	105
11	28	47	87	117	51	79	805	152	359	49	82	114
12	31	47	97	142	49	72	735	152	299	44	84	97
13	29	47	95	156	47	69	655	180	250	47	82	89
14	29	44	95	160	47	67	595	247	219	47	77	92
15	29	44	77	142	47	72	665	254	202	44	72	92
16	31	44	74	138	47	95	745	236	202	62	65	92
17	31	44	49	163	47	395	720	244	194	49	62	170
18	32	44	72	202	47	810	625	415	184	47	60	303
19	38	47	72	198	47	1000	545	515	170	44	57	315
20	36	49	62	188	49	905	480	466	163	42	258	254
21	32	57	57	149	55	775	427	423	152	47	343	212
22	34	62	62	156	170	745	387	387	138	42	423	188
23	38	72	77	108	355	680	339	339	123	40	359	339
24	31	84	163	77	367	595	295	283	102	40	250	453
25	31	92	367	105	303	585	272	226	92	36	188	407
26	31	105	435	108	212	555	254	184	87	34	146	335
27	31	108	403	100	177	466	244	152	79	132	117	295
28	31	120	343	89	160	435	250	138	77	194	100	268
29	31	114	315	84	117	427	283	123	69	166	87	247
30	31	108	291	77	---	440	315	114	65	102	77	222
31	31	---	272	72	---	471	---	123	---	82	69	---
TOTAL	895	1788	4436	4084	2904	10503	17056	7631	6589	1968	4482	5761
MEAN	28.9	59.6	143	132	100	339	569	246	220	63.5	145	192
MAX	38	120	435	244	367	1000	940	515	565	194	423	453
MIN	18	36	49	72	47	62	244	114	65	34	57	82
CFSM	.08	.17	.40	.37	.28	.96	1.60	.69	.62	.18	.41	.54
IN.	.09	.19	.46	.43	.30	1.10	1.79	.80	.69	.21	.47	.60

CAL YR 1979 TOTAL 55978 MEAN 153 MAX 1930 MIN 18 CFSM .43 IN 5.87
WTR YR 1980 TOTAL 68097 MEAN 186 MAX 1000 MIN 18 CFSM .52 IN 7.14

04112850 SYCAMORE CREEK NEAR HOLT, MI

LOCATION.--Lat 42°38'25", long 84°28'58", in SW¼ SW¼ sec.18, T.3 N., R.1 W., Ingham County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Holt Road, and 1.5 mi (2.4 km) east of Holt.

DRAINAGE AREA.--80.6 mi^2 (208.8 km^2).

PERIOD OF RECORD.--April 1975 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, Oct. 13 to Nov. 13, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--5 years, 47.8 ft^3/s (1.354 m^3/s), 8.05 in/yr (204 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,110 ft^3/s (59.8 m^3/s) Apr. 19, 1975, gage height, 10.00 ft (3.048 m); minimum, 3.8 ft^3/s (0.11 m^3/s) Sept. 29, Oct. 1, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 506 ft^3/s (14.3 m^3/s) Mar. 18, gage height, 7.07 ft (2.155 m); minimum, 3.8 ft^3/s (0.11 m^3/s) Oct. 1, gage height, 1.72 ft (0.524 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.4	11	20	39	15	23	116	84	59	18	19	72
2	8.6	10	16	35	14	21	104	72	50	16	38	94
3	6.0	9.5	15	33	13	19	166	63	100	15	175	79
4	5.0	10	16	30	13	18	204	55	128	14	193	57
5	4.9	12	18	27	12	17	232	49	81	21	116	43
6	5.2	11	21	23	12	16	170	45	66	28	63	35
7	5.6	10	22	21	12	15	124	39	81	18	45	29
8	6.4	9.0	21	20	12	15	107	36	195	18	35	27
9	6.8	8.5	17	20	12	15	133	34	169	15	30	54
10	8.4	10	17	19	12	15	147	32	101	15	24	90
11	8.6	11	19	33	12	19	136	33	66	15	24	53
12	11	12	26	45	12	17	115	32	50	15	27	39
13	10	10	24	42	12	17	99	41	42	13	23	37
14	9.0	9.0	21	33	12	18	100	70	39	13	21	40
15	7.5	9.5	19	31	12	19	166	55	46	13	21	41
16	7.0	11	16	30	12	30	169	45	74	18	19	37
17	7.0	10	14	43	12	259	127	43	65	21	18	94
18	7.2	9.7	13	50	12	467	99	116	48	15	18	165
19	7.5	9.0	12	45	12	305	83	125	43	13	18	139
20	8.0	11	13	38	12	220	71	91	48	12	244	88
21	8.5	12	13	34	20	172	63	67	40	14	402	66
22	9.0	19	15	33	104	161	60	55	33	15	355	72
23	12	24	22	28	130	119	55	46	29	13	259	271
24	15	28	44	25	100	95	51	40	27	12	184	299
25	13	21	125	22	70	107	61	35	26	11	125	205
26	11	27	136	19	50	94	60	31	22	11	86	139
27	9.7	27	98	18	33	79	55	29	22	17	62	94
28	8.5	30	69	18	29	75	64	28	21	29	46	69
29	7.5	29	56	17	25	89	81	27	18	45	38	58
30	7.0	25	47	17	---	107	89	26	17	32	34	53
31	9.0	---	42	16	---	103	---	51	---	23	30	---
TOTAL	254.3	445.2	1027	904	808	2746	3247	1595	1806	548	2792	2639
MEAN	8.20	14.8	33.1	29.2	27.9	88.6	108	51.5	60.2	17.7	90.1	88.0
MAX	15	30	136	50	130	467	232	125	195	45	402	299
MIN	4.4	8.5	12	16	12	15	51	26	17	11	18	27
CFSM	.10	.18	.41	.36	.35	1.10	1.34	.64	.75	.22	1.12	1.09
IN.	.12	.21	.47	.42	.37	1.27	1.50	.74	.83	.25	1.29	1.22

CAL YR 1979 TOTAL 15916.5 MEAN 43.6 MAX 970 MIN 3.9 CFSM .54 IN 7.35
WTR YR 1980 TOTAL 18811.5 MEAN 51.4 MAX 467 MIN 4.4 CFSM .64 IN 8.68

04113000 GRAND RIVER AT LANSING, MI

LOCATION.--Lat 42°45'02", long 84°33'19", in NW¼ sec.9, T.4 N., R.2 W., Ingham County, Hydrologic Unit 04050004, on right bank 30 ft (9 m) upstream from bridge on North Grand River Avenue in Lansing, 2.0 mi (3.2 km) downstream from Red Cedar River, and at mile 152 (245 km).

DRAINAGE AREA.--1,230 mi² (3,180 km²), approximately.

PERIOD OF RECORD.--March 1901 to September 1906, October 1934 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as "at North Lansing" 1901-6. Gage-height records collected in this vicinity 1907-10 (flood seasons only), 1911-19, 1920-28 (flood seasons only), and since 1931 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1174: 1949. WSP 1387: 1901, 1903-4, 1935, 1937, 1942.

GAGE.--Water-stage recorder. Datum of gage is 805.53 ft (245.526 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to August 1906, nonrecording gage at same site at different datum. November 1934 to June 1949 water-stage recorder at site 1.8 mi (2.9 km) downstream at datum 2.42 ft (0.738 m) lower.

REMARKS.--Records good. Large diurnal fluctuation at medium and low flows caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--51 years, 824 ft³/s (23.34 m³/s), 9.10 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 24,500 ft³/s (694 m³/s) Mar. 26, 1904, gage height, 18.60 ft (5.669 m), datum then in use, from rating curve extended above 15,000 ft³/s (425 m³/s); minimum, 2.8 ft³/s (0.079 m³/s) Sept. 9, 1963, gage height, 0.85 ft (0.259 m); minimum daily, 20 ft³/s (0.57 m³/s) Aug. 25, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, that of Mar. 26, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,240 ft³/s (91.8 m³/s) Mar. 19, gage height, 7.59 ft (2.313 m); minimum, 49 ft³/s (1.39 m³/s) Oct. 20, gage height, 1.67 ft (0.509 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	139	239	651	1130	327	532	1920	1460	741	344	409	779
2	171	159	565	1000	376	460	1870	1380	841	355	448	889
3	162	291	495	916	312	430	1890	1300	1140	233	938	962
4	134	153	534	876	311	398	2500	1240	1270	371	1210	987
5	113	251	581	718	268	413	2550	1160	1240	450	1120	911
6	184	264	504	624	261	427	2650	1070	1280	404	965	892
7	126	231	557	561	273	329	2570	985	1600	399	845	851
8	190	243	548	489	250	418	2330	888	1710	357	717	802
9	201	247	519	552	315	373	2310	839	1750	336	623	931
10	123	300	452	435	304	333	2390	834	1470	339	646	840
11	119	187	477	664	308	468	2340	761	1220	378	655	755
12	293	296	481	592	313	412	2430	751	1080	387	557	730
13	261	314	498	700	292	442	2060	879	1000	298	527	721
14	130	273	574	696	294	472	2170	967	1030	313	525	763
15	169	279	481	777	263	468	2250	891	980	254	425	724
16	82	345	504	674	293	547	2440	886	1070	543	503	690
17	116	271	366	723	277	1470	2350	901	1010	366	526	1110
18	108	239	312	785	288	2570	2170	1340	928	391	482	1190
19	137	245	390	833	313	2900	2000	1480	943	428	450	1310
20	214	255	408	786	323	2850	1800	1390	886	403	2000	1200
21	254	368	399	692	306	2750	1600	1330	862	404	1480	1100
22	206	424	394	647	740	2450	1570	1170	708	267	1860	1130
23	368	429	466	550	1090	2370	1360	1120	686	235	1590	1550
24	237	468	885	393	1220	2090	1420	976	570	303	1420	1640
25	249	550	1340	438	1090	2090	1340	824	539	300	1290	1630
26	242	755	1440	494	893	1820	1290	878	537	243	1040	1210
27	190	553	1430	502	770	1910	1260	733	439	775	960	1140
28	227	723	1280	460	755	1700	1360	678	518	513	848	966
29	119	635	1400	518	650	1680	1410	583	456	477	737	938
30	217	656	1200	415	---	1790	1450	555	324	454	698	846
31	187	---	1100	372	---	1840	---	671	---	466	588	---
TOTAL	5668	10643	21231	20012	13475	39202	59050	30920	28828	11786	27082	30187
MEAN	183	355	685	646	465	1265	1968	997	961	380	874	1006
MAX	368	755	1440	1130	1220	2900	2650	1480	1750	775	2000	1640
MIN	82	153	312	372	250	329	1260	555	324	233	409	690
CFSM	.15	.29	.56	.53	.38	1.03	1.60	.81	.78	.31	.71	.82
IN.	.17	.32	.64	.61	.41	1.19	1.79	.94	.87	.36	.82	.91

CAL YR 1979 TOTAL 246702 MEAN 676 MAX 5220 MIN 82 CFSM .55 IN 7.46
WTR YR 1980 TOTAL 298084 MEAN 814 MAX 2900 MIN 82 CFSM .66 IN 9.02

04113097 CARRIER CREEK NEAR LANSING, MI

LOCATION.--Lat 42°45'20", long 84°39'10", in SE¼ SW¼ sec.3, T.4 N., R.3 W., Eaton County, Hydrologic Unit 04050004, on left bank 15 ft (5 m) downstream from bridge on Willow Highway, 0.4 mi (0.6 km) upstream from mouth, and 2.6 mi (4.2 km) west of Lansing.

DRAINAGE AREA.--12.1 mi^2 (31.3 km^2).

PERIOD OF RECORD.--January 1975 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Altitude of gage is 805 ft (245 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--5 years, 5.26 ft^3/s (0.149 m^3/s), 5.90 in/yr (150 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 532 ft^3/s (15.1 m^3/s) Apr. 19, 1975, gage height, 6.76 ft (2.060 m); no flow on many days during June, July, August, and September 1977, and September 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft^3/s (2.27 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 25	0700	84	2.38	3.06	0.933	Aug. 20	0800	*169	4.79	*4.23	1.289

Minimum discharge, 0.02 ft^3/s (.001 m^3/s) Oct. 1, 2; minimum gage height, 0.48 ft (0.146 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.03	3.8	2.5	4.4	1.1	2.4	17	8.8	4.6	.87	1.4	3.8
2	.68	.50	2.0	3.5	1.1	2.0	14	7.3	3.4	.74	3.7	2.0
3	.66	.25	1.8	3.3	1.1	1.8	19	6.3	14	.57	5.8	1.4
4	.10	.22	1.8	2.7	1.1	1.7	42	5.3	5.4	.50	3.8	1.4
5	.18	.18	3.4	2.6	1.1	1.6	22	4.7	5.0	6.8	4.3	1.4
6	.30	.25	4.4	2.4	1.1	1.8	15	4.2	9.1	2.3	2.5	1.1
7	1.0	.74	3.6	2.1	1.1	1.5	12	3.7	19	1.2	1.4	.86
8	.10	.50	2.9	2.0	1.1	1.5	15	3.6	19	1.0	1.6	.52
9	.18	1.0	1.7	1.8	1.1	1.5	23	3.4	9.3	1.4	.80	2.8
10	.21	1.7	1.4	2.0	1.1	1.5	19	3.1	6.0	1.6	2.3	2.4
11	.45	.47	1.5	9.1	1.1	1.7	14	3.5	4.5	1.1	3.5	1.4
12	1.3	.54	5.2	8.0	1.1	1.8	15	2.8	3.7	1.0	1.6	1.1
13	.25	.50	2.0	3.5	1.1	1.7	11	8.8	3.0	.74	.67	1.7
14	.12	.53	1.5	2.5	1.1	1.6	18	8.5	5.9	.40	.67	1.1
15	.08	.63	1.2	2.2	1.1	1.8	24	4.9	4.4	.35	.46	.98
16	.40	.82	1.0	3.6	1.1	8.0	17	3.9	3.9	7.6	.33	.96
17	1.2	.58	.75	6.7	1.1	48	12	9.6	3.0	2.3	.74	30
18	.80	.50	.65	6.2	1.1	30	9.7	31	3.6	1.0	.76	14
19	1.3	.50	.41	5.1	1.2	15	9.0	16	5.8	.88	1.1	9.1
20	1.4	.58	.90	3.7	2.0	12	5.5	10	4.7	.54	114	6.1
21	.97	8.7	1.0	3.0	7.0	21	5.6	7.3	2.9	3.4	42	4.5
22	1.9	9.4	1.2	2.2	33	14	5.2	5.6	2.4	.91	22	6.0
23	7.3	6.5	5.3	1.9	19	9.7	4.5	4.7	1.9	.54	12	7.9
24	.76	3.2	18	1.7	9.2	9.3	5.9	3.9	1.7	.30	6.6	4.6
25	.35	2.5	52	1.7	5.5	6.7	9.0	3.2	1.5	.20	3.9	4.1
26	.25	4.5	30	1.7	9.5	6.5	5.7	2.4	1.3	.62	3.0	3.5
27	.18	4.7	17	1.7	3.5	7.0	5.5	1.9	1.2	24	2.0	3.0
28	.18	8.1	12	1.6	2.8	6.1	13	1.7	1.2	8.5	1.6	2.9
29	.15	4.6	8.3	1.5	2.5	9.7	13	1.6	1.2	3.9	1.4	2.5
30	.35	9.3	6.7	1.3	---	8.3	11	1.5	1.1	2.5	1.3	2.2
31	.30	---	5.3	1.2	---	17	---	3.8	---	1.7	2.2	---
TOTAL	23.55	75.80	208.11	97.3	115.7	254.5	411.5	187.2	153.2	79.45	249.43	125.32
MEAN	.76	2.53	6.71	3.14	3.99	8.21	13.7	6.04	5.11	2.56	8.05	4.18
MAX	7.3	9.6	52	9.1	33	48	42	31	19	24	114	30
MIN	.03	.18	.41	1.2	1.1	1.5	4.5	1.5	1.1	.20	.33	.62
CFSM	.06	.21	.55	.26	.33	.68	1.13	.50	.42	.21	.67	.35
IN.	.07	.23	.64	.30	.36	.78	1.27	.58	.47	.24	.77	.39

CAL YR 1979 TOTAL 1944.71 MEAN 5.33 MAX 180 MIN .00 CFSM .44 IN 5.99
WTR YR 1980 TOTAL 1981.17 MEAN 5.41 MAX 114 MIN .03 CFSM .45 IN 6.09

04114000 GRAND RIVER AT PORTLAND, MI

LOCATION.--Lat 42°51'20", long 84°54'45", in NW¼ sec.4, T.5 N., R.5 W., Ionia County, Hydrologic Unit 04050004, on left bank at downstream side of bridge on Kent Street, 1.0 mi (1.6 km) south of Portland, 1.9 mi (3.1 km) upstream from Looking Glass River, and at mile 115 (185 km).

DRAINAGE AREA.--1,385 mi² (3,587 km²).

PERIOD OF RECORD.--August 1952 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 705.00 ft (214.884 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 6, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Slight diurnal fluctuation caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--28 years, 903 ft³/s (25.57 m³/s), 8.85 in/yr (225 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,400 ft³/s (351 m³/s) Apr. 21, 1975, gage height, 12.98 ft (3.956 m); minimum, 38 ft³/s (1.08 m³/s) Oct. 10, 1963; minimum daily, 58 ft³/s (1.64 m³/s) Oct. 9, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,500 ft³/s (99.1 m³/s) Aug. 20, gage height, 8.27 ft (2.521 m); maximum gage height, 8.84 ft (2.694 m) Jan. 12, backwater from ice ; minimum daily discharge, 110 ft³/s (3.12 m³/s) Oct. 17.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	148	275	700	1170	420	704	2200	1020	710	400	483	649
2	178	338	647	1130	370	600	2180	1590	843	412	462	808
3	241	269	609	1100	420	550	2080	1470	1030	391	503	585
4	244	325	592	931	450	500	2640	1370	1230	312	1010	929
5	203	221	543	915	450	470	2470	1300	1290	434	1130	929
6	193	318	643	780	400	455	2430	1200	1410	546	1090	875
7	262	335	591	700	400	485	2540	1140	1390	454	886	842
8	201	303	613	600	310	405	2730	1020	2090	431	804	793
9	250	310	543	530	280	475	2760	966	1990	428	700	772
10	260	321	567	600	350	440	2750	897	1790	374	618	927
11	180	354	521	510	350	446	2740	880	1470	386	661	803
12	160	255	550	750	350	540	2600	836	1250	435	667	728
13	380	338	551	650	430	480	2500	833	1100	407	566	738
14	340	360	557	805	430	510	2380	1080	1040	330	541	722
15	180	339	605	754	430	547	2570	1020	1110	369	531	714
16	220	340	538	806	300	570	2570	951	1040	308	446	713
17	110	348	541	749	330	1050	2650	923	1190	623	505	1120
18	150	325	421	818	410	2630	2520	1370	1020	490	539	1230
19	140	290	407	552	330	3160	2270	1600	1010	337	498	1370
20	170	307	443	558	360	3200	2050	1600	1020	446	1790	1350
21	250	343	474	607	360	3160	1910	1460	893	455	2190	1190
22	320	521	424	750	350	2980	1700	1390	878	456	2120	1130
23	280	543	438	680	400	2620	1600	1190	730	362	2010	1360
24	470	523	546	636	1320	2470	1500	1140	714	245	1670	1720
25	320	536	1710	480	1290	2270	1570	1000	595	337	1450	1700
26	320	707	1910	500	1140	2220	1450	875	585	334	1270	1560
27	310	794	1740	560	431	1980	1390	926	573	611	1020	1200
28	250	710	1570	550	422	1950	1430	707	494	749	943	1090
29	300	774	1450	520	410	1870	1550	704	547	569	836	976
30	170	713	1340	510	---	1880	1620	657	494	535	729	926
31	335	---	1330	450	---	1950	---	659	---	495	699	---
TOTAL	7535	12497	24355	22541	14594	43615	66900	34383	31440	13465	29367	30749
MEAN	243	417	786	727	503	1407	2230	1109	1048	434	947	1025
MAX	470	794	1910	1170	1320	3200	2970	1620	2090	749	2190	1720
MIN	110	221	407	450	280	405	1390	657	494	245	446	649
CFSM	.18	.30	.57	.53	.36	1.02	1.61	.80	.76	.31	.68	.74
IN.	.20	.34	.65	.61	.39	1.17	1.80	.92	.84	.36	.79	.83

CAL YR 1979 TOTAL 293208 MEAN 803 MAX 6000 MIN 110 CFSM .58 IN 7.88
WTR YR 1980 TOTAL 331440 MEAN 905 MAX 3200 MIN 110 CFSM .65 IN 8.90

04114500 LOOKING GLASS RIVER NEAR EAGLE, MI

LOCATION.--Lat 42°49'45", long 84°46'40", in sec.10, T.5 N., R.4 W., Clinton County, Hydrologic Unit 04050004, on right bank at upstream side of former bridge site, 1.5 mi (2.4 km) northeast of Eagle and 10 mi (16 km) upstream from mouth.

DRAINAGE AREA.--281 mi² (728 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1387: 1946-47.

GAGE.--Water-stage recorder. Datum of gage is 747.09 ft (227.713 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to June 2, 1962, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Small intermittent diversion at times into Lake Geneva when discharge is above 50 ft³/s (1.42 m³/s). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 170 ft³/s (4.814 m³/s), 8.22 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,860 ft³/s (81.0 m³/s) Apr. 5, 1947, gage height, 7.70 ft (2.347 m), from graph based on gage readings, from rating curve extended above 1,900 ft³/s (53.8 m³/s); maximum gage height, 9.9 ft (3.02 m) Mar. 7, 1956, from high-water mark, backwater from ice; minimum discharge, 10 ft³/s (0.28 m³/s) July 28, 1965, gage height, 1.01 ft (0.308 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 580 ft³/s (16.4 m³/s) Mar. 17, gage height, 4.39 ft (1.338 m), backwater from ice; minimum, 22 ft³/s (0.62 m³/s) Oct. 1, 2, 3; minimum gage height, 1.23 ft (0.375 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	22	35	77	145	60	80	285	253	95	51	95	58
2	22	36	75	135	55	74	275	243	98	47	104	57
3	23	32	74	120	50	68	277	235	127	45	112	56
4	24	31	72	110	49	65	366	229	121	43	110	52
5	25	31	70	100	47	63	349	221	116	50	105	51
6	25	33	70	90	45	62	330	209	155	49	99	49
7	26	35	71	80	45	61	329	194	190	47	90	47
8	26	34	74	75	44	60	347	177	224	45	90	46
9	26	35	74	75	44	60	394	160	203	43	88	49
10	26	36	73	80	43	61	407	145	200	41	85	47
11	26	37	75	90	43	64	401	134	206	39	86	46
12	29	37	80	100	43	64	406	122	215	37	85	45
13	26	38	78	105	43	66	399	127	221	38	78	49
14	27	39	78	110	43	66	402	145	235	36	73	48
15	27	39	70	110	43	66	443	132	230	34	68	47
16	26	38	60	110	43	120	435	124	208	35	62	47
17	28	37	55	110	43	400	408	137	179	35	59	108
18	28	36	54	120	43	340	387	227	153	33	60	106
19	28	36	52	120	44	229	373	223	141	32	54	87
20	29	36	52	120	45	219	365	205	128	32	316	86
21	27	52	54	110	50	275	357	204	110	34	193	92
22	27	70	60	95	80	295	349	208	100	35	123	100
23	37	72	70	85	180	300	335	211	92	35	94	133
24	33	71	103	80	170	310	323	211	84	35	85	112
25	29	70	244	90	150	315	322	203	78	33	83	102
26	29	85	218	130	125	312	300	185	71	34	80	101
27	31	81	153	90	105	305	276	164	65	73	74	100
28	31	83	174	85	90	297	270	143	61	77	67	99
29	31	81	170	80	85	286	270	125	60	65	62	96
30	29	80	165	70	---	274	257	109	55	74	56	90
31	29	---	155	65	---	278	---	103	---	85	53	---
TOTAL	854	1456	2951	3085	1950	5535	10447	5514	4221	1392	2889	2206
MEAN	27.5	48.5	95.2	99.5	67.2	179	348	178	141	44.9	93.2	73.5
MAX	37	85	244	145	180	400	443	253	235	85	316	133
MIN	22	31	52	65	43	60	257	103	55	32	53	45
CFSM	.10	.17	.34	.35	.24	.64	1.24	.63	.50	.16	.33	.26
IN.	.11	.19	.39	.40	.26	.73	1.39	.73	.56	.18	.38	.29

CAL YR 1979 TOTAL 44457 MEAN 122 MAX 1750 MIN 22 CFSM .43 IN 5.84
WTR YR 1980 TOTAL 42500 MEAN 116 MAX 443 MIN 22 CFSM .41 IN 5.63

04115000 MAPLE RIVER AT MAPLE RAPIDS, MI

LOCATION.--Lat 43°06'35", long 84°41'35", in sec.5, T.8 N., R.3 W., Clinton County, Hydrologic Unit 04050005, on right bank at downstream side of bridge on Maple Road at Maple Rapids, 50 ft (15 m) upstream from Pine Creek, and 0.8 mi (1.3 km) upstream from Hayworth Creek. Records include flow of Pine Creek.

DRAINAGE AREA.--434 mi² (1,124 km²).

PERIOD OF RECORD.--August 1944 to current year.

REVISED RECORDS.--WSP 1707: 1956.

GAGE.--Water-stage recorder. Datum of gage is 642.58 ft (195.858 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 4, 1968, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 248 ft³/s (7.023 m³/s), 7.76 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 6,500 ft³/s (184 m³/s) Mar. 20, 1948; maximum gage height, 11.22 ft (3.420 m) Mar. 20, 1948, from floodmark, backwater from ice; minimum discharge, 4.4 ft³/s (0.12 m³/s) Aug. 13, 1965, gage height, 1.62 ft (0.494 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in March 1904 reached a stage of 13.8 ft (4.21 m), from information by local resident.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 954 ft³/s (27.0 m³/s) Apr. 11, gage height, 7.46 ft (2.274 m); minimum, 6.8 ft³/s (0.19 m³/s) Oct. 3, gage height, 1.98 ft (0.604 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.9	43	105	456	76	188	398	338	154	52	330	43
2	8.9	53	95	416	67	152	405	354	147	49	321	49
3	7.8	50	84	376	60	122	421	357	147	45	301	55
4	9.2	45	78	336	55	100	497	348	145	41	274	54
5	10	44	77	300	53	88	651	325	143	43	246	51
6	10	59	80	265	49	81	784	291	174	48	228	47
7	9.5	80	84	233	47	72	819	262	215	50	209	43
8	10	77	89	212	47	67	795	239	325	48	199	39
9	11	73	86	190	46	64	817	218	426	45	211	42
10	11	71	88	170	45	62	907	199	467	40	211	55
11	12	61	88	166	46	70	950	180	467	34	207	61
12	12	53	88	185	47	70	948	166	440	33	202	61
13	14	46	86	189	47	67	948	163	401	30	193	62
14	16	41	78	185	45	65	922	162	365	28	181	77
15	16	38	72	179	45	64	889	164	334	29	165	87
16	16	38	69	172	45	65	938	167	300	32	149	84
17	17	37	66	184	47	118	927	167	267	33	130	144
18	18	38	58	202	46	257	870	186	239	33	111	229
19	17	37	55	215	44	399	768	217	219	32	93	273
20	18	35	54	218	45	551	687	253	202	30	87	286
21	18	38	52	212	49	675	614	288	184	79	91	279
22	25	48	52	206	91	779	542	301	166	123	95	269
23	30	65	57	190	234	782	485	296	150	125	92	332
24	35	78	86	174	261	725	446	283	132	117	82	380
25	33	83	206	155	293	655	415	264	112	100	74	397
26	32	86	378	143	298	594	394	240	94	86	65	397
27	31	100	520	129	275	533	384	218	82	130	58	376
28	32	106	577	118	244	487	370	200	70	186	54	350
29	35	109	571	105	219	453	342	184	61	216	48	322
30	38	107	539	93	---	423	332	171	56	307	44	292
31	41	---	498	84	---	402	---	159	---	327	42	---
TOTAL	602.3	1839	5115	6458	2966	9230	19665	7360	6684	2571	4793	5236
MEAN	19.4	61.3	165	208	102	298	656	237	223	82.9	155	175
MAX	41	109	577	456	298	782	950	357	467	327	330	397
MIN	7.8	35	52	84	44	62	332	159	56	28	42	39
CFSM	.05	.14	.38	.48	.24	.69	1.51	.55	.51	.19	.36	.40
IN.	.05	.16	.44	.55	.25	.79	1.69	.63	.57	.22	.41	.45

CAL YR 1979 TOTAL 71524.7 MEAN 196 MAX 2060 MIN 5.1 CFSM .45 IN 6.13
WTR YR 1980 TOTAL 72519.3 MEAN 198 MAX 950 MIN 7.8 CFSM .46 IN 6.22

04116000 GRAND RIVER AT IONIA, MI

LOCATION.--Lat 42°58'20", long 85°04'13", in NW¼ sec.30, T.7 N., R.6 W., Ionia County, Hydrologic Unit 04050006, on left bank 15 ft (5 m) downstream from bridge on State Highway 66 at Ionia, 2.7 mi (4.3 km) downstream from Prairie Creek, and at mile 87 (140 km).

DRAINAGE AREA.--2,840 mi² (7,360 km²), approximately.

PERIOD OF RECORD.--March to June 1931, July and September 1931 (fragmentary), July 1951 to current year. Gage-height records for flood seasons collected in this vicinity 1907-28 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 615.38 ft (187.568 m) National Geodetic Vertical Datum of 1929. Mar. 19 to Sept. 24, 1931, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below about 5,000 ft³/s (142 m³/s) caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--29 years (water years 1952-80), 1,847 ft³/s (52.31 m³/s), 8.83 in/yr (224 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,500 ft³/s (609 m³/s) Apr. 1, 1960, gage height, 23.43 ft (7.141 m); minimum, 40 ft³/s (1.13 m³/s) May 13, 1968, gage height, 5.61 ft (1.710 m); minimum daily, 109 ft³/s (3.09 m³/s) July 16, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,170 ft³/s (146 m³/s) Apr. 10, gage height, 14.79 ft (4.508 m); minimum, 207 ft³/s (5.86 m³/s) Oct. 1, gage height, 6.68 ft (2.036 m); minimum daily, 302 ft³/s (8.55 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	302	459	1150	2530	750	1200	3420	2940	1160	747	1150	871
2	312	638	1130	2310	700	1100	3520	2710	1310	680	1100	1060
3	329	606	1190	2200	750	1000	3410	2670	1560	616	1100	1100
4	376	460	967	1900	690	900	4040	2500	1870	453	1360	1330
5	402	537	927	1600	630	850	4630	2380	1930	516	1700	1210
6	372	532	1020	1400	580	800	4690	2270	2070	760	1910	1150
7	372	546	1120	900	550	770	4590	2180	2510	754	1600	1130
8	406	590	1010	700	550	760	4560	1800	3400	725	1270	1190
9	395	579	1020	900	570	750	4840	1960	3540	498	1260	815
10	391	580	1030	1300	600	760	5140	1620	3200	730	1200	953
11	490	610	980	1500	650	770	5050	1630	2930	610	1120	1170
12	422	595	925	1600	690	800	4990	1520	2660	595	1180	942
13	399	546	957	1700	640	820	4930	1520	2360	618	1010	1140
14	486	611	1030	1800	600	850	4690	1560	2190	513	1110	992
15	418	599	923	1900	570	850	4670	1800	2180	512	959	958
16	365	565	960	1900	570	989	4890	1740	2150	532	890	980
17	406	665	950	1900	570	1850	4870	1650	1970	560	787	1430
18	426	597	800	1790	570	3520	4700	1870	1900	768	798	2120
19	358	557	760	1790	580	4690	4380	2570	1820	667	824	2030
20	365	536	820	1610	620	4720	3990	2720	1840	506	1600	2000
21	376	685	822	1690	650	4770	3700	2430	1700	838	3770	2040
22	426	860	767	1570	750	4880	3450	2270	1470	1000	2770	1970
23	566	965	972	1430	2000	4620	3170	2120	1440	888	2580	2130
24	590	946	908	1100	2300	4230	3000	1940	1180	823	2310	2510
25	665	881	2520	900	2200	4030	2870	1950	1080	632	1870	2640
26	546	1380	3590	900	2000	3750	2980	1830	946	620	1760	2610
27	506	1400	3140	1000	1700	3550	2630	1540	827	1050	1600	2400
28	426	1320	2990	1000	1500	3410	2610	1510	824	1580	1110	1950
29	430	1340	2880	1000	1300	3290	2790	1250	780	1280	1020	1950
30	502	1440	2760	1000	---	3110	2840	1120	788	1040	1100	1670
31	431	---	2710	850	---	3200	---	1410	---	1210	879	---
TOTAL	13256	22625	43728	45870	26830	71589	120040	60980	55585	23321	44697	46441
MEAN	428	754	1411	1480	925	2309	4001	1967	1853	752	1442	1548
MAX	665	1440	3590	2530	2300	4880	5140	2940	3540	1580	3770	2640
MIN	302	459	760	700	550	750	2610	1120	780	453	787	815
CFSM	.15	.27	.50	.52	.33	.81	1.41	.69	.65	.27	.51	.55
IN.	.17	.30	.57	.60	.35	.94	1.57	.80	.73	.31	.59	.61

CAL YR 1979 TOTAL 579348 MEAN 1587 MAX 11500 MIN 220 CFSM .56 IN 7.59
WTR YR 1980 TOTAL 574962 MEAN 1571 MAX 5140 MIN 302 CFSM .55 IN 7.53

04116500 FLAT RIVER AT SMYRNA, MI

LOCATION.--Lat 43°03'10", long 85°15'50", in NW¼ sec.28, T.8 N., R.8 W., Ionia County, Hydrologic Unit 04050006, on right bank at downstream side of highway bridge, and 0.5 mi (0.8 km) south of Smyrna.

DRAINAGE AREA.--528 mi² (1,368 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only for some periods, published in WSP 1727.

GAGE.--Water-stage recorder. Datum of gage is 729.53 ft (222.361 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are poor. Diurnal fluctuation caused by powerplants above station prior to September 1956; occasional diurnal fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 429 ft³/s (12.15 m³/s), 11.03 in/yr (280 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,100 ft³/s (87.8 m³/s) Apr. 22, 1967, gage height, 7.27 ft (2.216 m), caused by momentary release of water from storage above station; maximum gage height, 8.26 ft (2.518 m) Feb. 6, 1974, backwater from ice; minimum discharge, 7.4 ft³/s (0.21 m³/s) Sept. 9, 1953; minimum daily, 70 ft³/s (1.98 m³/s) Sept. 6, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,070 ft³/s (30.3 m³/s) Apr. 13; maximum gage height, 6.16 ft (1.878 m) Jan. 12, backwater from ice; minimum discharge, 75 ft³/s (2.12 m³/s) Aug. 8; minimum gage height, 3.00 ft (0.914 m) July 11.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	141	233	499	460	300	320	532	396	297	209	225	177
2	146	230	438	434	300	300	519	457	310	199	211	207
3	174	260	434	430	300	280	523	517	354	197	197	239
4	187	260	304	392	300	270	645	491	324	178	187	228
5	183	233	338	337	300	250	645	480	320	192	180	200
6	177	237	361	261	300	240	656	430	450	203	180	200
7	177	237	356	155	300	230	660	359	530	210	228	200
8	180	239	347	297	300	230	694	354	607	323	168	168
9	183	237	332	300	280	220	912	328	651	213	218	177
10	207	233	307	350	270	210	968	303	662	177	280	243
11	225	232	290	400	260	210	1010	275	631	158	292	207
12	214	243	313	500	250	210	1060	289	592	165	261	171
13	211	233	317	520	250	210	1070	334	534	169	246	190
14	204	232	276	520	240	289	1060	346	448	173	261	204
15	200	235	277	404	240	288	1060	354	434	182	190	197
16	204	235	251	404	250	284	999	347	429	211	152	465
17	211	232	190	472	250	440	913	338	385	202	200	328
18	197	232	235	513	250	572	823	434	337	190	214	432
19	190	232	225	527	250	720	711	480	318	184	211	475
20	190	232	226	526	260	836	642	489	326	183	397	414
21	204	269	319	492	270	932	561	456	332	252	475	389
22	236	335	292	460	300	964	458	425	330	277	414	372
23	280	405	277	380	375	959	398	379	317	265	410	465
24	273	398	365	310	377	921	364	347	280	224	340	505
25	322	453	525	310	364	849	344	295	234	194	261	565
26	270	536	562	310	274	779	393	295	220	198	218	530
27	258	474	666	300	316	710	402	295	217	232	214	465
28	225	487	708	300	352	646	410	277	226	246	228	428
29	228	529	619	300	268	598	417	221	226	250	336	410
30	231	521	662	300	---	559	401	260	225	261	207	360
31	223	---	477	300	---	542	---	306	---	250	204	---
TOTAL	6551	9144	11790	11964	8346	15068	20250	11357	11546	6567	7805	9611
MEAN	211	305	380	386	288	486	675	366	385	212	252	320
MAX	322	536	708	527	377	964	1070	517	662	323	475	565
MIN	141	230	190	155	240	210	344	221	217	158	152	168
CFSM	.40	.58	.72	.73	.55	.92	1.28	.69	.73	.40	.48	.61
IN.	.46	.64	.83	.84	.59	1.06	1.43	.80	.81	.46	.55	.68

CAL YR 1979 TOTAL 143483 MEAN 393 MAX 1230 MIN 140 CFSM .74 IN 10.11
WTR YR 1980 TOTAL 129999 MEAN 355 MAX 1070 MIN 141 CFSM .67 IN 9.16

04117500 THORNAPPLE RIVER NEAR HASTINGS, MI

LOCATION.--Lat 42°36'57", long 85°14'11", in SE¼ sec.27, T.3 N., R.8 W., Barry County, Hydrologic Unit 04050007, on downstream side of highway bridge, 0.6 mi (1.0 km) downstream from Cedar Creek, 2.0 mi (3.2 km) downstream from Thornapple Lake, and 3.2 mi (5.1 km) southeast of Hastings.

DRAINAGE AREA.--385 mi² (997 km²).

PERIOD OF RECORD.--October 1944 to current year.

GAGE.--Water-stage recorder. Datum of gage is 786.71 ft (239.789 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 1, 1965, nonrecording gage at same site and datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--36 years, 309 ft³/s (8.751 m³/s), 10.90 in/yr (277 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,810 ft³/s (193 m³/s) Apr. 7, 1947, gage height, 10.20 ft (3.109 m), from graph based on gage readings; minimum, 33 ft³/s (0.93 m³/s) Aug. 10, 1964, gage height, 2.71 ft (0.826 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,110 ft³/s (31.4 m³/s) Mar. 20, gage height, 5.21 ft (1.588 m); minimum, 84 ft³/s (2.38 m³/s) Oct. 1, gage height, 2.88 ft (0.878 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	86	141	342	640	169	224	550	388	207	138	178	249
2	90	164	343	530	166	207	595	384	231	133	184	276
3	88	172	243	451	163	191	635	361	280	128	280	276
4	92	164	272	388	154	184	680	330	343	125	428	257
5	94	152	261	330	149	181	740	297	370	136	520	235
6	101	146	280	268	149	172	785	273	379	146	550	210
7	107	144	309	228	146	172	790	253	419	146	525	188
8	112	144	326	210	143	175	780	231	594	149	447	172
9	112	146	313	207	146	166	795	220	719	146	357	169
10	112	149	243	207	146	175	890	210	729	146	280	178
11	114	152	268	245	149	188	980	210	660	141	238	191
12	121	155	276	293	143	188	968	210	530	138	217	191
13	125	152	288	318	143	194	884	220	410	138	197	181
14	125	149	280	368	149	188	790	253	335	133	191	178
15	121	149	257	322	149	188	730	289	313	125	184	178
16	118	152	235	293	152	221	700	297	343	133	175	178
17	123	149	194	305	146	461	685	281	361	154	166	253
18	125	149	181	348	146	770	655	325	352	154	160	379
19	128	146	197	365	149	1040	590	424	322	146	154	490
20	128	143	194	361	149	1090	525	490	305	143	261	535
21	128	163	184	330	160	1080	460	490	293	149	490	520
22	128	228	184	305	245	1040	406	433	261	152	694	461
23	141	305	207	284	471	947	370	357	231	149	806	410
24	161	339	301	231	630	837	343	297	207	138	827	401
25	164	326	544	221	645	729	334	257	194	128	811	401
26	158	370	885	217	485	635	343	228	181	123	740	392
27	146	456	1050	214	401	559	343	204	172	175	599	357
28	139	500	1070	207	339	500	338	184	157	221	437	313
29	136	480	1020	197	261	471	348	175	149	242	326	268
30	133	437	907	188	---	475	370	169	143	228	272	242
31	131	---	770	175	---	505	---	188	---	200	238	---
TOTAL	3787	6622	12614	9226	6643	14153	18402	8928	10190	4703	11932	8729
MEAN	122	221	407	298	229	457	613	288	340	152	385	291
MAX	164	500	1070	640	645	1090	980	490	729	242	827	535
MIN	86	141	181	175	143	166	334	169	143	123	154	169
CFSM	.32	.57	1.06	.77	.60	1.19	1.59	.75	.88	.40	1.00	.76
IN.	.37	.64	1.22	.89	.64	1.37	1.78	.86	.98	.45	1.15	.84

CAL YR 1979 TOTAL 138344 MEAN 379 MAX 3220 MIN 86 CFSM .98 IN 13.37
WTR YR 1980 TOTAL 115929 MEAN 317 MAX 1090 MIN 86 CFSM .82 IN 11.20

04118000 THORNAPPLE RIVER NEAR CALEDONIA, MI

LOCATION.--Lat 42°48'40", long 85°29'00", in NW¼ sec.22, T.5 N., R.10 W., Kent County, Hydrologic Unit 04050007, on right bank 200 ft (61 m) downstream from LaBarge powerplant, 2.3 mi (3.7 km) northeast of Caledonia, and 3.3 mi (5.3 km) downstream from Coldwater River.

DRAINAGE AREA.--773 mi² (2,002 km²).

PERIOD OF RECORD.--October 1930 to September 1938, October 1951 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 824: 1931-36. WSP 1307: 1931-37.

GAGE.--Water-stage recorder. Datum of gage is 676.31 ft (206.139 m) Consumers Power Co. datum. Oct. 1, 1930 to Sept. 30, 1938, nonrecording gage at same site and at National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Prior to Dec. 1, 1958, large diurnal fluctuation at low and medium flow caused by powerplant above station; occasional fluctuation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--37 years, 572 ft³/s (16.2 m³/s), 10.05 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,290 ft³/s (178 m³/s) May 10, 1956, gage height, 10.79 ft (3.289 m); maximum gage height, 10.96 ft (3.341 m) Apr. 22, 1975; minimum discharge, 1.0 ft³/s (0.028 m³/s) May 28, 1968, gage height, 1.40 ft (0.427 m), result of regulation during bridge construction.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 7, 1947, reached a stage of 14.4 ft (4.39 m) from information by powerplant operator.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,890 ft³/s (53.5 m³/s) Apr. 12, gage height, 5.99 ft (1.826 m); minimum, 180 ft³/s (5.10 m³/s) Oct. 3, gage height, 2.89 ft (0.881 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	226	414	817	1230	360	592	972	740	470	327	443	510
2	271	448	730	1070	350	520	1010	735	527	320	422	503
3	214	448	655	941	340	500	1070	718	713	309	467	535
4	264	449	609	836	330	480	1250	685	750	303	530	514
5	275	425	582	750	320	450	1290	636	756	334	656	476
6	278	411	601	600	310	430	1290	584	839	349	742	449
7	304	397	620	520	300	408	1290	545	944	364	761	419
8	309	390	662	480	300	402	1330	516	1300	374	732	402
9	351	387	645	480	300	407	1680	498	1370	348	653	312
10	311	392	621	480	300	437	1830	479	1360	345	558	407
11	302	393	592	500	300	459	1840	477	1260	331	503	334
12	354	384	603	600	300	444	1840	472	1110	329	456	393
13	362	382	603	650	300	429	1780	531	924	337	419	399
14	385	375	597	700	310	427	1610	555	802	324	395	395
15	330	374	541	724	320	433	1530	564	750	316	385	378
16	359	375	500	697	320	470	1400	576	750	337	372	373
17	380	372	450	782	320	774	1300	575	731	357	359	501
18	406	366	420	807	320	1240	1230	703	712	345	358	611
19	390	368	400	808	320	1470	1160	747	681	334	344	694
20	368	360	400	784	320	1670	1050	786	650	343	549	785
21	403	405	400	730	350	1790	950	801	608	521	889	827
22	399	547	410	670	450	1800	863	779	561	453	1040	835
23	424	629	455	600	1190	1680	789	710	510	430	1150	922
24	420	688	655	550	1200	1510	752	632	470	389	1170	822
25	403	646	1230	500	1170	1350	744	564	436	359	1150	795
26	411	875	1510	450	1050	1200	728	505	417	339	1110	746
27	402	914	1690	450	932	1070	721	470	392	539	1010	696
28	379	950	1740	450	783	975	714	438	378	579	843	641
29	347	933	1690	430	646	916	725	419	361	554	678	575
30	383	880	1590	400	---	878	733	410	338	528	565	525
31	358	---	1430	370	---	903	---	448	---	485	507	---
TOTAL	10768	15377	24448	20039	14061	26514	35471	18298	21870	11902	20216	16774
MEAN	347	513	789	646	485	855	1182	590	729	384	652	559
MAX	424	950	1740	1230	1200	1800	1840	801	1370	579	1170	922
MIN	214	360	400	370	300	402	714	410	338	303	344	312
CFSM	.45	.66	1.02	.84	.63	1.11	1.53	.76	.94	.50	.84	.72
IN.	.52	.74	1.10	.96	.68	1.28	1.71	.88	1.05	.57	.97	.81

CAL YR 1979 TOTAL 272501 MEAN 747 MAX 4960 MIN 178 CFSM .97 IN 13.11
WTR YR 1980 TOTAL 235738 MEAN 644 MAX 1840 MIN 214 CFSM .83 IN 11.34

04118500 ROGUE RIVER NEAR ROCKFORD, MI

LOCATION.--Lat 43°05'00", long 85°35'30", in NE¼ sec.15, T.8 N., R.11 W., Kent County, Hydrologic Unit 04050006, on left bank at downstream side of highway bridge, 2.2 mi (3.5 km) upstream from mouth, and 3.0 mi (4.8 km) southwest of Rockford.

DRAINAGE AREA.--234 mi² (606 km²).

PERIOD OF RECORD.--February 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 624.80 ft (190.439 m), corrected, National Geodetic Vertical Datum of 1929 (levels by Johnson and Anderson, Inc.). Prior to Aug. 30, 1952, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some diurnal fluctuation caused by mills above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 228 ft³/s (6.457 m³/s), 13.23 in/yr (336 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,540 ft³/s (100 m³/s) Mar. 6, 1976, gage height, 9.29 ft (2.832 m); minimum, 28 ft³/s (0.79 m³/s) Jan. 22, 1967, gage height, 3.41 ft (1.039 m); minimum daily, 49 ft³/s (1.39 m³/s) Aug. 27, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 765 ft³/s (21.7 m³/s) Apr. 11, gage height, 6.30 ft (1.920 m); minimum, 97 ft³/s (2.75 m³/s) Oct. 1, gage height, 3.80 ft (1.158 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	98	160	303	281	170	228	254	249	167	121	120	162
2	104	158	267	254	160	212	254	251	174	120	121	162
3	109	156	258	235	150	205	258	269	187	117	120	158
4	118	153	233	220	150	184	301	262	178	114	114	160
5	123	147	226	203	145	171	313	260	184	129	109	171
6	128	146	220	180	145	170	321	251	224	136	109	184
7	129	147	220	165	145	160	331	228	272	137	107	182
8	128	154	222	167	140	160	391	210	313	126	146	154
9	132	158	218	174	140	160	499	199	326	121	167	151
10	131	158	214	190	140	172	632	191	316	117	176	147
11	137	156	210	220	140	178	721	189	296	110	180	144
12	144	151	210	260	145	186	668	184	265	107	176	146
13	144	147	199	334	145	165	575	203	224	106	163	171
14	144	146	187	301	145	160	499	212	214	103	160	169
15	139	151	169	286	145	172	483	206	208	123	146	182
16	134	154	160	301	145	208	470	203	203	134	136	197
17	132	156	160	448	145	480	439	205	193	136	129	298
18	134	156	160	538	145	451	403	279	180	129	126	260
19	137	151	163	558	145	600	371	267	180	121	123	269
20	137	149	187	512	150	676	334	272	191	118	515	296
21	142	176	174	439	160	593	303	260	186	182	493	308
22	151	230	171	349	170	499	279	235	174	141	713	412
23	186	241	199	293	249	445	258	206	158	136	691	442
24	172	249	284	241	301	403	251	186	147	123	532	489
25	171	254	430	220	318	357	249	172	141	114	377	502
26	171	366	552	210	301	318	241	163	134	129	301	483
27	167	339	586	200	258	284	239	156	129	153	237	394
28	158	360	525	200	247	269	239	151	126	163	197	326
29	151	341	424	190	230	258	247	147	123	149	174	286
30	147	331	355	190	---	251	247	151	123	132	163	256
31	146	---	308	180	---	256	---	171	---	124	158	---
TOTAL	4344	5941	8194	8539	5169	9031	11070	6588	5936	3971	7179	7661
MEAN	140	198	264	275	178	291	369	213	198	128	232	255
MAX	186	366	586	558	318	676	721	279	326	182	713	502
MIN	98	146	160	165	140	160	239	147	123	103	107	144
CFSM	.60	.85	1.13	1.18	.76	1.24	1.58	.91	.85	.55	.99	1.09
IN.	.69	.94	1.30	1.36	.82	1.44	1.76	1.05	.94	.63	1.14	1.22

CAL YR 1979 TOTAL 95003 MEAN 260 MAX 1420 MIN 98 CFSM 1.11 IN 15.10
WTR YR 1980 TOTAL 83623 MEAN 228 MAX 721 MIN 98 CFSM .97 IN 13.29

04119000 GRAND RIVER AT GRAND RAPIDS, MI

LOCATION.--Lat 42°57'52", long 85°40'35", in NE¼ sec.25, T.7 N., R.12 W., Kent County, Hydrologic Unit 04050006, on right bank 500 ft (152 m) upstream from bridge on Fulton Street, 1.7 mi (2.7 km) upstream from Plaster Creek, and at mile 41 (66 km).

DRAINAGE AREA.--4,900 mi² (12,700 km²), approximately.

PERIOD OF RECORD.--March 1901 to December 1905, January 1906 to August 1918 (gage heights only), October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records collected in this vicinity since 1907 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 924: 1938(M). WSP 1387: 1901-5, 1940.

GAGE.--Water-stage recorder. Datum of gage is 585.70 ft (178.521 m) National Geodetic Vertical Datum of 1929 (levels by City of Grand Rapids). March 1901 to August 1918, nonrecording gage at Fulton Street Bridge 500 ft (152 m) downstream and Oct. 1, 1930 to Oct. 26, 1953, water-stage recorder at sewage pumping station 1 mi (1.6 km) downstream at datum 2.99 ft (0.911 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Moderate diurnal fluctuation at low and medium flow caused by powerplants above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--54 years, 3,530 ft³/s (99.97 m³/s), 9.78 in/yr (248 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904, gage height, 19.5 ft (5.94 m), from graph based on gage readings, site then in use; minimum daily, 381 ft³/s (10.8 m³/s) Aug. 9, 17, 1936.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum discharge since at least 1901, 54,000 ft³/s (1,530 m³/s) Mar. 28, 1904.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 9,170 ft³/s (260 m³/s) Apr. 12, gage height, 9.40 ft (2.865 m); minimum observed, 931 ft³/s (26.4 m³/s) Oct. 3, gage height, 2.71 ft (0.826 m), but may have been less during period of no gage-height record Oct. 1, 2.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	960	1470	3450	5400	1800	2700	5480	5200	2610	1710	2170	2090
2	997	1490	2930	4910	1700	2400	5670	5160	2510	1690	2110	2090
3	1020	1610	2630	4570	1700	2200	5830	4870	2840	1590	2040	2190
4	1060	1610	2580	4400	1700	2100	6370	4550	3220	1520	2060	2240
5	1080	1530	2360	4020	1600	2000	6940	4500	3530	1520	2310	2330
6	1170	1530	2310	2890	1500	1900	7250	4030	3950	1520	2690	2290
7	1180	1520	2430	1760	1500	1800	7230	3270	4710	1710	2950	2220
8	1190	1540	2540	1480	1500	1800	7430	2950	5600	1740	2850	2140
9	1200	1590	2430	2000	1500	1800	8360	2800	6190	1710	2540	2130
10	1230	1550	2380	2300	1500	1800	8920	2910	6160	1520	2410	1820
11	1250	1510	2320	2600	1600	1770	9070	2580	5830	1640	2270	1920
12	1340	1550	2220	3000	1600	1800	9120	2630	5420	1550	2180	2060
13	1340	1580	2150	3400	1500	1960	8940	2820	4920	1500	2170	2060
14	1290	1520	2070	3700	1500	1980	8630	2950	4740	1500	2050	2140
15	1340	1560	2120	3800	1500	2090	8390	2950	4320	1410	2050	2020
16	1340	1570	2110	3800	1500	2150	8160	3180	4050	1500	1940	2010
17	1300	1550	1900	3800	1500	3310	7990	3220	3880	1500	1810	2650
18	1270	1580	2000	4000	1500	5050	7790	3820	3600	1500	1700	2950
19	1300	1580	1920	4200	1500	6600	7460	4080	3420	1640	1720	3650
20	1330	15[illegible]0	1900	4200	1500	7640	6960	4560	3310	1620	3610	3900
21	1430	1640	1860	4000	1600	8150	6400	4650	3220	1880	4750	3920
22	1320	2000	1920	3700	2340	8330	5950	4400	2930	2080	5860	4240
23	1540	2250	2040	3300	3610	8250	5510	4110	2630	2110	5410	4750
24	1600	2370	2840	2150	4700	7920	5150	3780	2480	1960	5140	4670
25	1830	2440	4840	2170	4980	7420	4970	3400	2260	1800	4650	4780
26	1780	3390	6270	2310	4370	6920	4890	3140	2110	1640	4070	4840
27	1600	3840	6660	2400	4000	6420	4820	2950	1960	1770	3700	4660
28	1470	3770	6400	1980	3500	6020	4610	2660	1810	2300	3270	4300
29	1210	3550	6290	2170	3100	5760	4620	2630	1790	2660	2590	3690
30	1160	3480	5970	2200	---	5470	5190	2410	1740	2340	2310	3460
31	1360	---	5690	2000	---	5350	---	2360	---	2090	2250	---
TOTAL	40487	59710	97570	98610	63400	130860	204100	109520	107740	54220	89630	90210
MEAN	1306	1990	3147	3181	2186	4221	6803	3533	3591	1749	2891	3007
MAX	1830	3840	6660	5400	4980	8330	9120	5200	6190	2660	5860	4840
MIN	960	1470	1860	1480	1500	1770	4610	2360	1740	1410	1700	1820
CFSM	.27	.41	.64	.65	.45	.86	1.39	.72	.73	.36	.59	.61
IN.	.31	.45	.74	.75	.48	.99	1.55	.83	.82	.41	.68	.68

CAL YR 1979 TOTAL 1206784 MEAN 3306 MAX 17400 MIN 960 CFSM .68 IN 9.16
WTR YR 1980 TOTAL 1146057 MEAN 3131 MAX 9120 MIN 960 CFSM .64 IN 8.70

04119300 GRAND RIVER AT EASTMANVILLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°00'53", long 85°57'21", in NE¼ NW¼ sec.10, T.7 N., R.14 W., Ottawa County, Hydrologic Unit 04050006, at bridge on 68th Avenue at Eastmanville, 1.1 mi (1.8 km) downstream from Deer Creek, and at mile 19.3 (31.1 km).

DRAINAGE AREA.--5,230 mi² (13,550 km²), approximately.

PERIOD OF RECORD.--February 1979 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1979 to current year.
WATER TEMPERATURES: February 1979 to current year.

REMARKS.--Specific conductance and water temperature records are based on once-daily measurements, by a local observer, between 1600 and 1900 hours. Water-discharge measurement made at time of monthly sampling. Biological Data (Phytoplankton) is for the 1979-80 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1100 micromhos Mar. 2, 1979; minimum daily recorded, 404 micromhos Mar. 10, 1979.
WATER TEMPERATURES.--Maximum daily, 27.0°C July 11, 12, 1979, July 16, 17, 1980; minimum, 0.0°C on many days during winter period.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 858 micromhos March 14; minimum, 443 micromhos March 24.
WATER TEMPERATURES: Maximum, 27.0°C July 16, 17; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
OCT											
22...	1130	1510	675	8.3	16.5	8.0	83	260	K35	270	65
NOV											
26...	1300	3770	610	8.2	6.0	10.8	89	E2200	>240	260	62
JAN											
02...	1300	6000	610	7.6	2.0	12.6	92	200	110	280	110
FEB											
05...	1345	1730	735	8.1	.5	13.0	91	K4	K4	330	88
MAR											
10...	1430	1910	648	7.7	1.0	11.6	84	K1	K6	290	79
APR											
15...	1300	9350	555	7.8	6.0	11.2	93	K170	250	260	85
MAY											
05...	1315	4620	644	8.1	18.0	11.6	125	170	K34	300	94
JUN											
16...	1330	4280	665	7.8	19.0	7.7	84	41	60	270	66
JUL											
22...	1400	2300	465	8.0	25.0	7.7	93	--	270	230	87
AUG											
20...	1330	4820	464	8.1	22.0	9.5	110	>600	--	230	69
SEP											
23...	1300	5980	464	8.0	18.0	7.2	77	>1200	>1200	230	61

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
22...	70	22	28	.7	25	3.0	250	0	205	2.0	63
NOV											
26...	69	21	23	.6	22	3.1	240	0	197	2.4	53
JAN											
02...	77	22	18	.5	17	3.3	210	0	172	6.4	72
FEB											
05...	91	26	32	.8	17	2.7	300	0	246	3.8	85
MAR											
10...	79	23	31	.8	19	3.1	260	0	213	8.3	72
APR											
15...	70	20	15	.4	11	3.0	210	0	172	5.3	53
MAY											
05...	84	23	20	.5	12	2.4	260	0	210	3.3	62
JUN											
16...	72	21	18	.5	13	2.6	270	0	220	6.8	55
JUL											
22...	58	20	28	.8	21	2.7	240	0	140	2.7	55
AUG											
20...	57	21	25	.7	19	3.5	240	0	160	3.1	55
SEP											
23...	63	18	17	.5	14	3.6	220	0	170	3.5	43

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DIS-SOLVED (MG/L AS CL)	FLUORIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)	NITROGEN, ORGANIC TOTAL (MG/L AS N)
OCT 22...	47	.2	4.1	395	364	1610	.75	.36	.44	.84
NOV 26...	37	.2	6.6	362	336	3690	1.6	.19	.23	1.3
JAN 02...	36	.2	8.5	370	363	5990	5.4	.21	.25	1.4
FEB 05...	54	.2	6.9	458	457	2140	2.2	.63	.76	.87
MAR 10...	52	.2	8.2	426	405	2200	1.9	.57	.69	.63
APR 15...	30	.2	5.6	375	313	9470	2.9	.17	.21	.93
MAY 05...	39	.2	2.6	461	364	5750	1.1	.29	.35	1.0
JUN 16...	35	.2	6.4	423	340	4890	2.1	.26	.31	1.1
JUL 22...	49	.2	3.9	340	337	2110	.11	.04	.05	.20
AUG 20...	47	.3	3.8	346	310	4500	.58	.31	.38	1.1
SEP 23...	30	.2	9.2	314	293	5070	1.5	.22	.27	1.1

DATE	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUS-PENDED (MG/L)	SEDIMENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 22...	1.2	2.0	8.6	.160	.49	.070	--	16	65	100
NOV 26...	1.5	3.1	14	.290	.89	.090	7.7	49	499	100
JAN 02...	1.6	7.0	31	.100	.31	.060	--	19	308	100
FEB 05...	1.5	3.7	16	.120	.37	.090	--	1	4.7	100
MAR 10...	1.2	3.1	14	.190	.58	.190	7.5	20	103	100
APR 15...	1.1	4.0	18	.140	.43	.070	12	20	505	100
MAY 05...	1.3	2.4	11	.100	.31	.050	15	29	362	100
JUN 16...	1.4	3.5	16	.160	.49	.050	11	46	532	100
JUL 22...	.24	.35	1.6	.020	.06	.020	--	47	292	100
AUG 20...	1.4	2.0	8.8	.070	.21	.010	8.1	167	2170	100
SEP 23...	1.3	2.8	12	.250	.77	.090	10	78	1260	100

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS- SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV- ERABLE (UG/L AS BA)	BARIUM, DIS- SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV- ERABLE (UG/L AS CD)	CADMIUM DIS- SOLVED (UG/L AS CD)	CHRO- MIUM, TOTAL RECOV- ERABLE (UG/L AS CR)	CHRO- MIUM, DIS- SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV- ERABLE (UG/L AS CO)	COBALT, DIS- SOLVED (UG/L AS CO)
OCT 22...	1130	2	1	100	40	0	0	10	10	0	2
JAN 02...	1300	2	1	100	70	0	0	10	<10	0	0
FEB 05...	1345	4	3	200	70	0	0	10	10	0	0
JUL 22...	1400	1	1	<50	60	0	4	10	10	0	0

DATE	COPPER, TOTAL RECOV- ERABLE (UG/L AS CU)	COPPER, DIS- SOLVED (UG/L AS CU)	IRON, TOTAL RECOV- ERABLE (UG/L AS FE)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV- ERABLE (UG/L AS PB)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, TOTAL RECOV- ERABLE (UG/L AS MN)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV- ERABLE (UG/L AS HG)	MERCURY DIS- SOLVED (UG/L AS HG)
OCT 22...	8	5	400	20	8	1	80	20	.1	.1
JAN 02...	5	3	600	30	3	0	30	10	.3	.2
FEB 05...	9	7	240	10	5	0	40	30	.2	.2
JUL 22...	3	2	1100	10	10	0	10	4	.1	<.1

DATE	NICKEL, TOTAL RECOV- ERABLE (UG/L AS NI)	NICKEL, DIS- SOLVED (UG/L AS NI)	SELE- NIUM, TOTAL (UG/L AS SE)	SELE- NIUM, DIS- SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV- ERABLE (UG/L AS AG)	SILVER, DIS- SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV- ERABLE (UG/L AS ZN)	ZINC, DIS- SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS- SOLVED (MG/L AS C)	CARBON, ORGANIC SUS- PENDED (MG/L AS C)
OCT 22...	15	14	0	0	--	0	40	8	4.1	--
JAN 02...	8	8	0	0	0	0	20	30	7.3	.7
FEB 05...	14	7	0	0	0	0	100	10	8.0	.3
JUL 22...	10	2	0	0	0	0	20	2	6.2	.6

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

PERIPHYTON

DATE	TIME	LENGTH OF EXPO- SURE (DAYS)	BIOMASS CHLORO- PHYLL RATIO PERI- PHYTON (UNITS)	PERI- PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI- PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI- PHYTON CHROMO- GRAPHIC FLUOROM (MG/M2)
JAN 02...	1300	37	333	1.02	1.18	.480	.000
JUN 16...	1330	42	738	2.36	3.15	1.07	.170
AUG 20...	1330	29	866	9.37	12.4	3.50	.000

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 7,79		MAY 7,79		JUN 5,79		JUL 11,79		AUG 7,79	
TIME	1100		1100		1600		0930		1130	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	220	4	9200#	54	--	-	21000#	20	11000	9
....MELOSIRA	730	14	--	-	--	-	2400	2	10000	9
....STEPHANODISCUS	88	2	--	-	6700#	23	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	*	0	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	*	0	--	-	--	-	--	-	--	-
....COCCONEIS	66	1	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	*	0	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	*	0	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	44	1	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	88	2	700	4	1100	4	--	-	--	-
....FRAGILARIA	*	0	--	-	1300	4	3900	4	2300	2
....SYNEDRA	310	6	--	-	*	0	*	0	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	88	2	200	1	--	-	--	-	--	-
...NAVICULACEAE										
....AMPHIPLEURA	*	0	--	-	--	-	--	-	--	-
....NAVICULA	400	7	100	1	--	-	--	-	--	-
....NEIDIUM	88	2	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....HANTZSCHIA	--	-	--	-	--	-	--	-	--	-
....NITZSCHIA	240	5	1600	9	330	1	630	1	3200	3
...SURIRELLACEAE										
....CYMATOPLEURA	*	0	--	-	--	-	--	-	--	-
....SURIRELLA	*	0	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	*	0	*	0
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	200	1	--	-	*	0	860	1
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	4600	4
....ANACYSTIS	--	-	--	-	7500#	25	16000#	16	2300	2
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	2500	2	--	-
....ANABAENOPSIS	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	2000#	38	--	-	--	-	--	-	11000	9
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	200	1	*	0	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 7,79		MAY 7,79		JUN 5,79		JUL 11,79		AUG 7,79	
TIME	1100		1100		1600		0930		1130	
TOTAL CELLS/ML	5300		17000		30000		100000		120000	
DIVERSITY: DIVISION	1.5		1.0		1.6		1.5		1.4	
.CLASS	1.5		1.0		1.6		1.5		1.4	
..ORDER	2.0		1.8		1.9		1.8		2.1	
...FAMILY	2.7		2.4		2.6		3.0		2.9	
....GENUS	3.1		2.4		3.1		3.5		3.5	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	8600	8	12000	11
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	1500	9	--	-	4000	4	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	*	0	*	0	2600	2
....MICRACTINIUM	--	-	1700	10	3600	12	16000#	15	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	300	2	660	2	1600	2	2900	2
....CHLORELLA	--	-	--	-	--	-	1100	1	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	860	1
....DICTYOSPHAERIUM	--	-	--	-	1800	6	4000	4	--	-
....GLOEOACTINIUM	--	-	--	-	--	-	--	-	2000	2
....KIRCHNERIELLA	--	-	100	1	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	*	0
....SELENASTRUM	44	1	--	-	--	-	760	1	*	0
....TETRAEDRON	*	0	--	-	*	0	*	0	860	1
....TREUBARIA	--	-	--	-	--	-	*	0	--	-
....WESTELLA	--	-	--	-	--	-	--	-	1100	1
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	880	3	8100	8	2300	2
....CRUCIGENIA	--	-	--	-	--	-	1000	1	1100	1
....SCENEDESMUS	680	13	400	2	3300	11	9400	9	36000#	31
....TETRASTRUM	--	-	--	-	1800	6	*	0	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	400	2	--	-	--	-	5200	4
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	--	-	200	1	--	-	--	-	--	-
....CHLAMYDOMONAS	44	1	100	1	330	1	--	-	1700	1
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	SEP 17,79 1230		NOV 26,79 1300		MAR 10,80 1430		MAY 5,80 1315	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	9600	11	4400#	54	300#	46	11000#	33
....MELOSIRA	3400	4	110	1	29	4	3000	9
....STEPHANODISCUS	690	1	--	-	--	-	*	0
....THALASSIOSIRA	--	-	220	3	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	660	2
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	56	1	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	6	1	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	110	1	29	4	*	0
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	59	9	--	-
...NAVICULACEAE								
....AMPHIPLEURA	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	41	6	990	3
....NEIDIUM	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....HANTZSCHIA	--	-	--	-	--	-	--	-
....NITZSCHIA	1800	2	280	3	18	3	2200	6
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	330	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	28000#	33	--	-	--	-	330	1
....COCCOCHLORIS	--	-	--	-	--	-	330	1
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....ANABAENOPSIS	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	2300	3	--	-	--	-	--	-
....SCHIZOTHRIX	--	-	670	8	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	500	1
....TRACHELOMONAS	*	0	--	-	23	4	*	0

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04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	SEP 17,79	NOV 26,79	MAR 10,80	MAY 5,80
TIME	1230	1300	1430	1315
TOTAL CELLS/ML	84000	8200	660	34000
DIVERSITY: DIVISION	1.5	1.2	1.0	1.3
.CLASS	1.5	1.2	1.0	1.3
..ORDER	2.0	1.5	1.8	2.0
...FAMILY	2.6	1.6	2.4	2.7
....GENUS	3.1	1.9	2.7	3.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	1800	2	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	5300	6	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	4800	14
...OOCYSTACEAE								
....ANKISTRODESMUS	2300	3	110	1	6	1	1200	3
....CHLORELLA	--	-	--	-	82	13	*	0
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	2300	7
....GLOEOACTINIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	690	1	--	-	--	-	1800	5
....OOCYSTIS	1400	2	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	6	1	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	1800	2	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	19000#	23	2200#	27	23	4	1700	5
....TETRASTRUM	1800	2	--	-	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	1800	2	--	-	--	-	1700	5
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	1100	1	--	-	35	5	500	1
...PHACOTACEAE								
....PHACOTUS	460	1	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	*	0	--	-	--	-	--	-

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04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 16,80		JUL 22,80		AUG 20,80		SEP 23,80	
TIME	1330		1400		1330		1300	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	3200#	22	8100#	24	16000#	18	2500#	26
....MELOSIRA	3600#	24	--	-	5200	6	400	4
....STEPHANODISCUS	--	-	--	-	--	-	1300	14
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	50	1
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	*	0	--	-	--	-	--	-
....FRAGILARIA	870	6	--	-	--	-	--	-
....SYNEDRA	--	-	*	0	*	0	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	*	0	--	-
...NAVICULACEAE								
....AMPHIPLEURA	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	--	-	50	1
....NEIDIUM	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....HANTZSCHIA	--	-	--	-	*	0	--	-
....NITZSCHIA	*	0	700	2	--	-	--	-
...SURIRELLACEAE								
....CYMATOPLEURA	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	400	4
....ANACYSTIS	990	7	--	-	--	-	50	1
....COCCOCHLORIS	--	-	--	-	--	-	--	-
....GOMPHOSPHAERIA	--	-	--	-	24000#	28	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....ANABAENOPSIS	--	-	--	-	--	-	450	5
...OSCILLATORIACEAE								
....OSCILLATORIA	930	6	3400	10	18000#	20	1200	12
....SCHIZOTHRIX	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	*	0	--	-	--	-	50	1

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04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 16,80		JUL 22,80		AUG 20,80		SEP 23,80	
TIME	1330		1400		1330		1300	
TOTAL CELLS/ML	15000		34000		88000		9500	
DIVERSITY: DIVISION	1.4		1.3		1.5		1.6	
.CLASS	1.4		1.3		1.5		1.6	
..ORDER	2.0		1.7		2.1		2.1	
...FAMILY	2.6		3.1		2.6		2.6	
....GENUS	3.3		3.5		2.9		3.3	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	*	0	280	1	--	-	50	1
...COELASTRACEAE								
....COELASTRUM	620	4	1400	4	8100	9	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	3800	11	6400	7	--	-
...MICRACTINIACEAE								
....GOLENKINIA	190	1	1500	5	--	-	--	-
....MICRACTINIUM	250	2	2800	8	--	-	50	1
...OOCYSTACEAE								
....ANKISTRODESMUS	*	0	420	1	600	1	50	1
....CHLORELLA	310	2	--	-	--	-	--	-
....CHODATELLA	--	-	*	0	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....GLOEOACTINIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	250	2	--	-	*	0	--	-
....OOCYSTIS	190	1	2200	7	*	0	400	4
....SELENASTRUM	560	4	*	0	--	-	250	3
....TETRAEDRON	--	-	--	-	--	-	50	1
....TREUBARIA	--	-	--	-	--	-	50	1
....WESTELLA	--	-	2200	7	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	2600	3	--	-
....CRUCIGENIA	--	-	--	-	810	1	--	-
....SCENEDESMUS	1900	13	4200	12	3600	4	1500#	16
....TETRASTRUM	250	2	560	2	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	1100	3	--	-	400	4
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	370	3	700	2	*	0	250	3
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	810	1	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04119300 GRAND RIVER AT EASTMANVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	661	706	656	602	730	581	558	633	682	645	631	586
2	672	645	648	642	736	---	558	633	638	643	621	647
3	672	652	665	640	745	---	556	632	638	643	632	650
4	671	650	663	641	751	---	556	632	640	643	633	645
5	687	650	706	638	761	---	562	685	638	644	636	647
6	685	663	706	638	762	---	568	690	638	642	636	650
7	668	665	704	677	778	---	571	699	640	643	633	646
8	655	660	702	678	781	---	545	690	638	636	633	649
9	675	659	706	670	782	852	544	693	598	638	634	---
10	684	658	677	679	781	847	550	694	598	635	634	658
11	675	658	708	673	786	853	541	692	598	635	634	635
12	676	671	697	677	782	849	542	692	595	636	633	632
13	676	671	707	673	771	849	541	692	593	635	632	630
14	671	668	709	681	771	858	574	617	597	645	632	632
15	684	668	717	692	770	849	571	614	595	645	589	637
16	690	676	717	605	767	592	571	614	643	645	592	659
17	685	675	709	604	767	595	577	607	641	621	591	656
18	697	674	722	598	754	591	571	618	642	621	593	658
19	696	668	736	600	757	590	585	640	644	622	590	659
20	655	670	728	648	784	467	585	644	642	621	592	664
21	656	674	731	653	776	481	587	635	642	617	587	584
22	655	601	702	655	717	484	613	639	642	628	573	583
23	674	601	714	658	591	473	603	641	649	602	577	581
24	632	623	507	697	595	443	616	673	649	607	580	582
25	646	622	505	738	597	446	628	668	648	604	574	586
26	642	557	506	744	583	484	628	674	647	605	575	589
27	641	562	573	737	583	483	630	672	651	605	587	650
28	638	623	577	699	583	486	631	682	651	622	591	648
29	667	625	575	733	584	532	632	682	651	623	586	643
30	700	626	575	722	---	530	634	685	650	623	587	645
31	704	---	601	737	---	542	---	682	---	623	585	---
MEAN	671	647	663	669	722		581	659	634	629	607	

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18.0	11.0	4.0	3.0	.0	1.0	6.0	14.0	22.0	24.0	23.0	24.0
2	17.0	10.0	3.0	3.0	.0	---	7.0	14.0	20.0	24.0	23.0	24.0
3	16.0	10.0	2.0	3.0	.0	---	8.0	14.0	20.0	24.0	24.0	24.0
4	15.0	9.0	2.0	2.0	.0	---	8.0	15.0	21.0	24.0	24.0	24.0
5	15.0	9.0	2.0	1.0	.0	---	8.0	16.0	21.0	24.0	24.0	24.0
6	15.0	8.0	2.0	1.0	.0	---	8.0	15.0	21.0	24.0	25.0	23.0
7	13.0	7.0	2.0	.0	.0	---	9.0	15.0	20.0	24.0	25.0	23.0
8	13.0	7.0	2.0	.0	.0	---	9.0	15.0	20.0	24.0	25.0	23.0
9	12.0	6.0	2.0	.0	.0	1.0	8.0	15.0	20.0	24.0	25.0	23.0
10	11.0	6.0	3.0	.0	.0	1.0	8.0	15.0	20.0	24.0	25.0	22.0
11	10.0	5.0	3.0	.0	.0	1.0	8.0	15.0	20.0	24.0	25.0	22.0
12	10.0	5.0	4.0	.0	.0	1.0	7.0	15.0	20.0	24.0	25.0	22.0
13	10.0	5.0	4.0	.0	.0	1.0	7.0	15.0	20.0	24.0	25.0	21.0
14	9.0	5.0	3.0	.0	1.0	2.0	7.0	15.0	20.0	25.0	25.0	20.0
15	9.0	6.0	2.0	1.0	1.0	3.0	7.0	15.0	20.0	26.0	24.0	19.0
16	10.0	9.0	2.0	1.0	.0	3.0	7.0	16.0	20.0	27.0	23.0	19.0
17	11.0	9.0	.0	1.0	.0	2.0	7.0	16.0	21.0	27.0	23.0	19.0
18	12.0	9.0	.0	1.0	1.0	2.0	7.0	16.0	21.0	26.0	23.0	18.0
19	13.0	7.0	.0	1.0	1.0	2.0	9.0	17.0	21.0	25.0	23.0	17.0
20	14.0	7.0	.0	1.0	2.0	2.0	10.0	17.0	21.0	25.0	23.0	17.0
21	15.0	9.0	1.0	1.0	3.0	3.0	11.0	18.0	21.0	25.0	23.0	17.0
22	16.0	9.0	2.0	1.0	3.0	4.0	12.0	18.0	21.0	25.0	23.0	17.0
23	13.0	10.0	3.0	1.0	1.0	5.0	13.0	19.0	21.0	25.0	23.0	17.0
24	12.0	10.0	4.0	.0	1.0	4.0	14.0	20.0	23.0	25.0	23.0	17.0
25	10.0	9.0	4.0	.0	1.0	4.0	15.0	21.0	23.0	25.0	23.0	17.0
26	9.0	8.0	4.0	.0	1.0	5.0	16.0	22.0	23.0	25.0	23.0	17.0
27	9.0	7.0	4.0	.0	1.0	5.0	16.0	22.0	24.0	25.0	24.0	16.0
28	9.0	6.0	4.0	.0	1.0	5.0	16.0	22.0	24.0	24.0	24.0	16.0
29	9.0	5.0	4.0	.0	1.0	6.0	15.0	22.0	24.0	24.0	24.0	15.0
30	10.0	5.0	3.0	.0	---	6.0	14.0	22.0	24.0	23.0	24.0	15.0
31	10.0	---	3.0	.0	---	6.0	---	22.0	---	23.0	24.0	---
MEAN	12.0	7.5	2.5	.5	.5		10.0	17.0	21.0	24.5	24.0	19.5

04121300 CLAM RIVER AT VOGEL CENTER, MI

LOCATION.--Lat 44°12'02", long 85°03'10", in SW¼ NW¼ sec.21, T.21 N., R.6 W., Missaukee County, Hydrologic Unit 04060102, on left bank 10 ft (3 m) downstream from bridge on county road, 0.5 mi (0.8 km) north of Vogel Center, and 3.5 mi (5.6 km) southeast of Falmouth.

DRAINAGE AREA.--243 mi² (629 km²).

PERIOD OF RECORD.--June 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,130 ft (344 m), from topographic map.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--14 years, 126 ft³/s (3.568 m³/s), 7.04 in/yr (179 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,150 ft³/s (32.6 m³/s) Apr. 13, 1971, gage height, 6.33 ft (1.929 m); minimum, 29 ft³/s (0.82 m³/s) Nov. 3, 1969, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 22	2000	388	11.0	4.14	1.262	Apr. 10	1300	*397	11.2	*4.18	1.274

Minimum discharge, 52 ft³/s (1.47 m³/s) Sept. 9; minimum gage height, 2.48 ft (0.756 m) Jan. 7, Mar. 12, result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	70	96	106	115	102	84	192	160	100	88	79	79
2	70	94	102	112	102	84	191	147	105	78	76	87
3	71	92	106	105	101	88	196	148	105	71	75	84
4	70	91	106	90	100	88	178	141	101	66	74	75
5	70	94	108	88	97	86	161	134	98	63	71	69
6	70	96	110	84	96	84	174	127	102	63	69	64
7	71	96	110	79	96	84	182	124	121	62	68	62
8	71	94	104	86	94	85	206	122	149	63	70	58
9	71	92	94	96	92	85	320	118	159	65	71	72
10	71	92	115	110	92	84	388	116	143	62	72	79
11	72	91	108	143	92	80	337	115	127	59	73	70
12	78	89	115	152	92	80	269	114	122	59	79	66
13	94	89	96	154	93	80	244	120	119	61	80	75
14	102	89	94	141	92	81	229	157	118	58	79	86
15	95	90	89	135	92	82	227	157	123	60	76	87
16	92	91	84	129	93	88	232	130	126	63	73	90
17	88	91	79	166	92	110	228	112	120	64	73	141
18	84	90	82	195	91	127	212	125	112	62	72	170
19	88	90	96	210	92	162	201	147	132	62	71	139
20	95	89	96	188	94	229	196	129	189	74	72	113
21	94	89	94	167	97	325	191	110	178	91	72	105
22	91	104	99	135	96	369	181	102	123	83	70	109
23	121	116	117	112	95	321	147	99	93	73	68	124
24	137	110	153	111	92	229	125	93	79	67	66	125
25	126	104	189	110	88	184	116	91	72	64	63	119
26	109	149	196	104	83	166	110	87	68	69	64	119
27	101	210	178	108	85	160	109	86	66	80	65	118
28	100	185	155	105	88	161	121	84	85	78	68	114
29	100	146	139	104	88	173	134	84	120	86	71	112
30	96	125	123	102	---	192	154	86	103	97	69	108
31	94	---	120	102	---	203	---	95	---	86	69	---
TOTAL	2762	3174	3563	3845	2707	4454	5951	3660	3458	2177	2218	2919
MEAN	89.1	106	115	124	93.3	144	198	118	115	70.2	71.5	97.3
MAX	137	210	196	210	102	369	388	160	189	97	80	170
MIN	70	89	79	79	83	80	109	84	66	58	63	58
CFSM	.37	.44	.47	.51	.38	.59	.82	.49	.47	.29	.29	.40
IN.	.42	.49	.55	.59	.41	.68	.91	.56	.53	.33	.34	.45

CAL YR 1979 TOTAL 48896 MEAN 134 MAX 625 MIN 60 CFSM .55 IN 7.49
WTR YR 1980 TOTAL 40888 MEAN 112 MAX 388 MIN 58 CFSM .46 IN 6.26

04121500 MUSKEGON RIVER AT EVART, MI

LOCATION.--Lat 43°53'57", long 85°15'19", in NW¼ NE¼ sec.3, T.17 N., R.8 W., Osceola County, Hydrologic Unit 04060102, on right bank 500 ft (152 m) downstream from bridge on U.S. Highway 10 in Evart, 0.4 mi (0.6 km) upstream from Twin Creek, and at mile 123.9 (199.4 km).

DRAINAGE AREA.--1,450 mi² (3,760 km²) approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1437: 1934, 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 977.72 ft (298.009 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 7, 1956, nonrecording gages at sites 400 ft (122 m) and 500 ft (152 m) upstream at present datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Some regulation during low flow from dams above station.

AVERAGE DISCHARGE.--48 years, 993 ft³/s (28.12 m³/s), 9.30 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,790 ft³/s (221 m³/s) Mar. 29, 1976; maximum gage height, 14.42 ft (4.395 m) Apr. 9, 1959; minimum discharge observed, 164 ft³/s (4.64 m³/s) Dec. 20, 1947, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) Apr. 16, gage height, 9.49 ft (2.893 m); maximum gage height, 9.50 ft (2.896 m) Apr. 12; minimum discharge, 425 ft³/s (12.0 m³/s) Oct. 1, 2; minimum gage height, 6.68 ft (2.036 m) Aug. 27, 28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	428	712	1110	1100	690	640	1600	1690	676	823	579	527
2	428	717	1010	1020	680	630	1630	1680	685	781	559	568
3	436	702	990	940	680	630	1660	1650	685	740	548	571
4	442	684	1000	840	670	620	1700	1640	678	703	530	542
5	452	670	1050	760	660	610	1680	1580	671	676	523	517
6	453	686	1090	719	650	600	1670	1520	760	649	517	496
7	459	714	1070	820	660	600	1690	1460	820	622	517	475
8	468	717	1000	1180	650	600	1890	1390	899	656	535	457
9	483	710	940	1220	640	600	2430	1330	917	633	532	475
10	485	701	930	1300	630	600	2680	1240	931	607	513	497
11	483	678	899	1420	620	600	2820	1160	890	582	532	502
12	498	671	936	1550	630	600	2890	1080	824	565	583	507
13	507	671	890	1450	630	600	2850	1070	772	556	562	689
14	527	666	820	1320	620	600	2830	1210	741	538	567	688
15	542	670	740	1220	620	600	2910	1280	730	531	558	648
16	542	671	720	1200	640	600	2960	1240	764	528	530	626
17	538	678	610	1390	640	640	2900	1190	769	515	519	984
18	529	678	470	1490	640	840	2760	1330	745	501	512	1080
19	542	678	510	1520	640	1100	2580	1410	766	495	506	1030
20	575	674	630	1520	630	1400	2450	1370	915	519	521	997
21	582	693	680	1350	652	1900	2330	1270	990	554	514	930
22	585	767	897	1050	667	2200	2200	1170	1020	576	500	985
23	645	842	998	880	674	2350	2080	1090	997	585	487	1060
24	684	863	1150	720	695	2100	1950	1030	936	560	475	996
25	702	846	1330	700	680	1910	1840	969	872	536	465	949
26	708	1130	1370	700	660	1780	1700	895	805	528	462	915
27	704	1270	1360	700	650	1740	1600	829	742	536	456	873
28	708	1300	1320	700	640	1680	1530	772	767	554	452	835
29	707	1270	1280	700	640	1630	1600	725	825	558	460	800
30	706	1210	1190	690	---	1590	1660	693	844	556	465	768
31	699	---	1150	690	---	1580	---	682	---	574	466	---
TOTAL	17247	23941	30140	32859	18878	34170	65070	37645	24436	18337	15945	21987
MEAN	556	798	972	1060	651	1102	2169	1214	815	592	514	733
MAX	708	1300	1370	1550	695	2350	2960	1690	1020	823	583	1080
MIN	428	666	470	690	620	600	1530	682	671	495	452	457
CFSM	.38	.55	.67	.73	.45	.76	1.50	.84	.56	.41	.35	.51
IN.	.44	.61	.77	.84	.48	.88	1.67	.97	.63	.47	.41	.56

CAL YR 1979 TOTAL 432872 MEAN 1186 MAX 5190 MIN 387 CFSM .82 IN 11.11
WTR YR 1980 TOTAL 340655 MEAN 931 MAX 2960 MIN 428 CFSM .64 IN 8.74

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1956 to current year.

INSTRUMENTATION.--Temperature recorder since November 1956.

REMARKS.--Temperature recorder clock stopped Nov. 10-19 (range in temperature 2.5 to 4.5°C), Dec. 14-19 (range in temperature 0.0 to 1.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 1963, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 25.0°C July 15, 19, 20; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	17.0	14.0	8.5	8.0	1.5	1.0	.0	.0	.0	.0	1.0	1.0
2	16.0	14.0	8.0	7.0	1.0	1.0	.0	.0	.0	.0	1.0	.5
3	14.5	13.5	7.0	6.0	1.0	1.0	.0	.0	.0	.0	.5	.5
4	13.5	12.0	6.0	5.5	1.0	1.0	.0	.0	.0	.0	.5	.5
5	13.0	11.5	6.0	5.5	1.0	1.0	.0	.0	.0	.0	.5	.5
6	12.0	11.0	6.0	6.0	1.0	1.0	.0	.0	.0	.0	.5	.5
7	11.0	9.5	6.0	5.5	1.0	1.0	.0	.0	.0	.0	.5	.5
8	10.5	9.0	5.5	4.5	1.0	1.0	.0	.0	.0	.0	1.0	.5
9	9.0	8.5	4.5	4.0	1.0	1.0	.0	.0	.0	.0	1.0	.5
10	9.0	8.0	---	---	1.0	1.0	.0	.0	.0	.0	.5	.5
11	8.5	7.0	---	---	1.5	1.0	.0	.0	.0	.0	.5	.5
12	7.0	6.5	---	---	1.5	1.5	.0	.0	.0	.0	1.5	1.0
13	7.0	6.0	---	---	1.5	1.0	.0	.0	.0	.0	1.0	1.0
14	6.5	6.0	---	---	---	---	.0	.0	.5	.5	1.0	.5
15	8.5	6.0	---	---	---	---	.0	.0	.5	.5	1.0	.5
16	9.0	7.0	---	---	---	---	.0	.0	.5	.5	1.0	.5
17	9.5	9.0	---	---	---	---	.0	.0	.5	.5	.5	.5
18	9.5	9.0	---	---	---	---	.0	.0	.5	.5	1.0	.5
19	10.5	9.5	---	---	---	---	.0	.0	.5	.5	1.5	.5
20	11.5	10.5	4.5	4.5	.0	.0	.0	.0	1.0	1.0	.5	.5
21	13.5	11.5	4.5	4.5	.0	.0	.0	.0	1.0	1.0	.0	.0
22	15.0	13.5	5.0	4.5	.0	.0	.0	.0	.0	.0	.5	.0
23	15.0	11.5	5.0	5.0	.0	.0	.0	.0	.5	.5	.5	.5
24	11.5	9.5	5.0	5.0	.0	.0	.0	.0	.5	.5	.5	.5
25	9.5	7.0	4.5	4.0	.5	.0	.0	.0	.5	.5	1.5	.5
26	7.0	6.5	4.0	4.0	.5	.5	.0	.0	1.0	.5	3.0	1.5
27	6.5	6.0	4.0	4.0	.5	.5	.0	.0	.5	.5	3.0	2.0
28	6.0	6.0	4.0	3.5	.5	.5	.0	.0	1.0	.5	3.0	2.0
29	6.5	5.5	3.5	3.0	.5	.5	.0	.0	1.0	.5	3.5	3.0
30	6.5	6.0	3.0	1.5	.5	.0	.0	.0	---	---	4.0	3.5
31	8.0	6.5	---	---	.0	.0	.0	.0	---	---	4.0	4.0
MONTH	17.0	5.5					.0	.0	1.0	.0	4.0	.0

04121500 MUSKEGON RIVER AT EVART, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.5	3.5	11.0	10.0	17.0	14.5	19.5	18.0	23.5	20.0	20.5	19.5
2	5.5	4.5	13.5	11.0	15.5	14.0	21.0	18.0	23.5	21.0	20.5	19.5
3	5.5	4.5	15.5	13.0	18.0	15.0	22.0	18.5	23.0	19.5	20.5	18.0
4	4.5	3.5	16.5	14.5	18.5	15.5	22.0	19.5	23.0	19.5	20.5	18.5
5	4.0	3.0	18.0	16.0	18.0	16.0	22.0	20.0	22.0	20.5	20.5	18.0
6	4.0	4.0	18.0	16.0	18.5	15.5	23.0	19.0	22.0	20.0	20.5	18.0
7	4.5	4.0	16.0	13.5	18.5	17.0	22.0	19.5	24.0	21.0	20.5	17.0
8	5.0	4.5	13.5	11.0	18.5	15.5	23.0	19.5	24.5	21.5	20.5	17.0
9	5.0	5.0	11.0	10.5	16.0	14.5	22.0	19.5	24.5	21.5	20.5	19.0
10	5.0	4.5	10.5	10.0	15.0	13.5	23.5	19.5	24.0	21.0	19.5	16.0
11	4.5	4.0	13.5	10.0	16.0	13.5	24.5	21.0	21.0	20.0	18.5	15.0
12	4.0	4.0	14.5	12.0	18.0	14.5	24.5	21.0	20.5	18.5	17.0	16.0
13	4.0	3.5	14.5	12.0	19.5	16.0	24.0	20.5	20.0	17.0	17.0	15.5
14	3.5	3.5	12.0	11.0	20.5	18.5	24.5	21.5	20.0	16.5	17.0	16.0
15	3.5	3.0	13.0	11.5	20.0	17.0	25.0	23.5	20.5	17.0	16.0	14.5
16	4.0	3.0	14.0	11.5	18.5	15.0	24.5	22.0	20.5	16.5	15.0	14.5
17	4.0	4.0	14.0	13.5	18.5	15.0	24.5	21.5	19.5	18.0	14.5	13.5
18	5.5	4.0	13.5	13.5	19.0	16.5	23.5	20.5	20.5	17.0	13.5	12.0
19	8.0	5.5	16.0	13.5	18.5	15.0	25.0	21.0	20.0	18.0	14.0	12.0
20	10.0	8.5	17.0	15.0	17.0	14.0	25.0	22.0	21.5	18.5	14.5	14.0
21	11.5	10.0	18.5	15.5	18.0	15.5	24.5	23.0	23.0	20.0	15.5	14.5
22	13.5	11.0	19.5	18.0	19.5	16.5	24.0	21.5	23.5	20.0	15.5	15.0
23	13.5	12.0	20.5	18.5	21.0	18.5	24.0	20.5	23.0	19.0	15.0	14.0
24	13.0	11.0	20.5	19.5	22.0	20.0	23.5	20.0	23.0	19.5	14.0	12.0
25	11.5	10.0	21.0	19.5	23.5	21.0	23.0	20.5	22.0	20.0	13.5	13.0
26	11.0	10.5	20.5	18.5	24.5	21.5	22.0	20.0	23.0	19.5	13.0	11.5
27	10.5	10.0	20.0	17.0	24.5	21.0	20.0	19.5	23.5	20.5	11.5	10.5
28	10.0	9.5	19.5	18.5	21.5	19.0	21.5	19.5	23.0	20.0	11.5	10.0
29	9.5	9.0	19.5	18.0	21.5	20.0	23.0	20.0	23.5	20.0	13.0	10.5
30	10.0	9.0	19.0	18.0	20.0	18.5	22.0	20.0	23.0	20.5	14.0	11.5
31	---	---	19.0	17.0	---	---	21.0	20.0	22.0	20.0	---	---
MONTH	13.5	3.0	21.0	10.0	24.5	13.5	25.0	18.0	24.5	16.5	20.5	10.0

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI

LOCATION.--Lat 43°30'09", long 85°20'33", in SW¼ SW¼ sec.24, T.13 N., R.9 W., Mecosta County, Hydrologic Unit 04060102, on right bank at upstream side of highway bridge on 130th Avenue, 0.5 mi (0.8 km) downstream from Rustford Dam, and 5.2 mi (8.4 km) east of Morley.

DRAINAGE AREA.--138 mi² (357 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 920 ft (280 m), from topographic map.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Feb. 16 to Mar. 19, which are poor. Some regulation by dams above station.

AVERAGE DISCHARGE.--14 years, 125 ft³/s (3.540 m³/s), 12.30 in/yr (312 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,010 ft³/s (28.6 m³/s) Aug. 31, 1975, gage height, 5.92 ft (1.804 m); minimum, 22 ft³/s (0.62 m³/s) July 21, 1979, gage height, 1.53 ft (0.466 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 355 ft³/s (10.1 m³/s) Mar. 21, gage height, 3.20 ft (0.975 m), no peak above base of 400 ft³/s (11.3 m³/s); minimum, 49 ft³/s (1.39 m³/s) Oct. 1, 2, 3, July 26; minimum gage height, 1.67 ft (0.509 m) July 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	49	87	117	105	84	74	147	139	79	76	61	75
2	49	89	114	102	83	75	148	128	80	72	58	85
3	52	83	112	100	82	75	150	122	78	68	60	87
4	55	107	99	98	80	76	186	113	73	66	57	78
5	55	109	101	97	79	76	208	106	114	65	56	72
6	55	106	105	96	78	76	195	102	182	64	56	67
7	61	106	109	96	77	76	176	100	303	65	55	65
8	61	104	118	96	76	76	217	101	290	70	80	63
9	73	103	106	98	76	76	339	98	162	70	107	73
10	69	99	101	100	76	76	324	86	102	67	88	82
11	66	97	102	102	77	76	282	84	87	65	87	75
12	70	94	100	102	78	76	254	82	81	67	110	74
13	69	91	95	104	78	76	225	96	80	74	97	125
14	66	91	90	104	78	76	200	100	79	76	86	132
15	65	93	86	104	78	78	207	94	79	75	80	108
16	67	97	84	104	78	85	194	88	79	74	75	95
17	67	93	86	104	78	100	171	99	79	70	71	187
18	67	91	86	105	77	300	159	166	79	68	61	175
19	79	89	84	105	77	280	152	142	81	65	58	142
20	83	88	80	104	76	325	151	116	94	63	87	125
21	80	103	82	101	76	332	129	103	81	63	88	118
22	81	141	95	100	76	261	122	95	78	61	77	150
23	113	143	118	98	76	210	117	91	77	57	70	206
24	108	125	242	96	76	174	119	87	75	53	66	157
25	94	114	232	95	76	153	128	83	73	53	64	128
26	85	223	181	93	75	148	121	79	72	59	63	118
27	82	202	145	91	75	144	118	76	72	80	61	109
28	84	173	129	89	75	146	118	76	80	72	68	113
29	82	142	121	87	75	150	144	77	86	67	77	108
30	79	127	112	86	---	151	151	84	81	63	69	103
31	77	---	107	85	---	149	---	83	---	62	65	---
TOTAL	2243	3410	3539	3047	2246	4246	5352	3096	3056	2070	2258	3295
MEAN	72.4	114	114	98.3	77.4	137	178	99.9	102	66.8	72.8	110
MAX	113	223	242	105	84	332	339	166	303	80	110	206
MIN	49	83	80	85	75	74	117	76	72	53	55	63
CFSM	.53	.83	.83	.71	.56	.99	1.29	.72	.74	.48	.53	.80
IN.	.60	.92	.95	.82	.61	1.14	1.44	.83	.82	.56	.61	.89

CAL YR 1979 TOTAL 45632 MEAN 124 MAX 440 MIN 46 CFSM .90 IN 12.25
WTR YR 1980 TOTAL 37858 MEAN 103 MAX 339 MIN 49 CFSM .75 IN 10.21

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped May 12 to June 17 (range in temperature 9.0 to 21.5ºC), Aug. 12-26 (range in temperature 16.5 to 23.5ºC).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0ºC Aug. 23, 1968, June 28, 1971; minimum, 0.0ºC on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 25.5ºC July 11, 20; minimum, 0.0ºC on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	15.5	12.5	11.0	8.5	2.0	1.0	2.5	2.0	.5	.5	1.0	.5
2	14.5	13.0	8.0	7.0	1.0	.0	2.5	2.5	.5	.5	1.0	.5
3	14.0	13.0	7.0	6.0	.5	.5	2.5	1.5	.5	.5	.5	.5
4	13.5	11.5	6.0	5.0	1.5	.5	1.5	.5	.5	.0	.5	.5
5	13.0	11.0	7.0	5.5	3.5	1.5	1.0	.5	.5	.5	3.0	.5
6	12.0	11.0	7.0	6.0	3.5	2.5	.5	.5	.5	.5	1.5	1.0
7	12.0	10.0	6.0	5.0	3.0	2.0	.5	.5	.5	.0	3.5	1.0
8	10.0	9.0	5.5	4.5	3.0	1.0	.5	.5	.5	.0	4.5	2.0
9	10.5	8.0	4.5	2.5	1.5	.5	.5	.0	.5	.5	4.5	1.0
10	10.0	8.0	3.5	3.0	2.5	1.5	.5	.0	.5	.5	4.5	3.5
11	8.5	7.5	3.5	2.0	5.0	2.5	.0	.0	.5	.5	3.0	1.0
12	8.5	8.0	3.5	2.5	5.0	2.0	.0	.0	.5	.5	2.5	1.0
13	8.5	7.5	4.0	3.5	2.0	.5	.0	.0	.5	.5	1.5	1.0
14	8.0	6.5	4.0	3.5	.5	.5	.0	.0	1.5	.5	5.5	1.0
15	11.0	7.5	4.0	3.5	1.0	.5	1.5	.0	1.5	1.0	5.5	.5
16	10.0	9.0	4.0	2.5	1.5	.5	2.5	1.5	1.5	.5	6.0	2.5
17	12.0	10.0	5.5	3.0	.5	.5	2.5	2.0	.5	.5	5.0	1.0
18	11.0	10.5	5.5	3.5	.5	.5	2.0	1.5	.5	.5	2.5	1.0
19	12.5	11.0	7.0	5.0	.5	.5	2.0	1.5	3.0	.5	4.5	1.5
20	13.5	12.0	7.0	6.0	.5	.5	1.5	.5	3.5	3.0	4.5	2.0
21	15.0	13.5	6.5	5.5	2.0	.5	1.0	.0	4.5	3.5	4.0	2.0
22	17.0	15.0	7.0	6.0	3.5	2.0	1.5	1.0	2.5	1.0	4.0	1.0
23	16.0	10.5	7.0	6.0	4.5	3.5	1.0	.5	3.0	2.0	4.0	3.0
24	10.5	8.5	6.0	5.0	4.5	4.0	.5	.0	3.5	2.0	3.0	3.0
25	8.5	6.5	5.0	4.0	4.0	2.0	.0	.0	3.0	1.0	5.5	2.5
26	6.5	6.0	5.0	4.5	2.0	1.5	.5	.0	1.0	.5	5.5	3.5
27	6.5	5.5	5.0	4.5	2.0	1.5	.5	.0	1.5	.5	5.5	3.5
28	7.0	6.5	4.5	3.0	2.0	1.5	.5	.5	1.5	1.0	6.5	4.5
29	7.5	5.5	3.0	2.0	2.0	1.5	.5	.5	1.0	1.0	7.0	4.5
30	8.0	6.0	2.5	2.0	2.0	1.0	.5	.5	---	---	6.5	4.5
31	10.5	7.0	---	---	2.0	1.0	.5	.5	---	---	5.5	5.0
MONTH	17.0	5.5	11.0	2.0	5.0	.0	2.5	.0	4.5	.0	7.0	.5

04121900 LITTLE MUSKEGON RIVER NEAR MORLEY, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	7.5	3.5	14.0	10.0	---	---	19.5	15.0	24.5	18.5	20.0	17.5
2	10.5	6.5	16.5	11.0	---	---	22.5	16.5	22.0	19.0	21.5	18.5
3	8.5	5.5	17.5	12.0	---	---	23.0	16.5	23.5	17.5	21.0	16.5
4	5.5	3.0	19.0	13.0	---	---	22.5	17.5	23.5	17.5	21.5	17.5
5	8.0	3.0	19.5	14.5	---	---	22.5	19.0	23.0	20.0	21.0	17.0
6	7.0	5.5	17.0	13.5	---	---	23.0	17.0	23.0	19.0	21.0	17.0
7	7.0	6.5	13.0	10.0	---	---	21.5	17.0	24.5	20.0	20.5	16.0
8	8.0	7.0	10.0	8.5	---	---	24.0	18.5	24.5	20.5	21.5	16.5
9	7.5	6.0	11.5	8.0	---	---	22.5	18.0	23.5	21.0	20.0	18.0
10	6.0	5.0	11.0	8.0	---	---	25.0	18.0	22.5	20.0	18.0	14.5
11	5.5	4.5	17.0	10.5	---	---	25.5	20.0	20.0	19.5	16.5	14.0
12	6.0	5.0	---	---	---	---	25.0	20.0	---	---	16.5	15.5
13	7.0	4.0	---	---	---	---	23.5	18.5	---	---	18.0	16.0
14	6.0	4.5	---	---	---	---	25.0	20.	---	---	18.0	16.0
15	5.5	4.0	---	---	---	---	24.0	22.0	---	---	16.0	14.5
16	7.5	3.5	---	---	---	---	23.5	19.5	---	---	15.5	14.5
17	7.5	5.0	---	---	---	---	24.0	19.0	---	---	14.5	13.5
18	11.0	6.0	---	---	19.0	15.0	22.5	18.0	---	---	14.0	12.0
19	13.0	8.5	---	---	18.0	13.0	25.0	19.0	---	---	15.0	12.5
20	14.5	10.0	---	---	18.0	11.5	25.5	20.0	---	---	16.5	14.5
21	14.0	10.5	---	---	19.0	14.0	24.5	20.5	---	---	17.5	16.0
22	17.0	11.0	---	---	21.5	15.5	23.5	19.0	---	---	16.5	15.5
23	15.5	11.5	---	---	22.5	17.0	24.0	18.0	---	---	15.5	13.5
24	11.5	8.0	---	---	24.0	18.0	24.0	17.5	---	---	14.0	12.0
25	12.0	7.0	---	---	24.0	19.0	21.5	18.0	---	---	13.5	12.0
26	10.5	9.0	---	---	25.0	19.5	20.5	18.0	---	---	13.0	11.5
27	11.0	9.0	---	---	23.0	19.0	18.5	17.5	23.0	18.5	11.5	10.0
28	10.0	9.0	---	---	21.5	16.0	22.0	18.0	22.5	19.5	12.5	10.5
29	9.5	9.0	---	---	20.0	17.5	23.0	18.5	23.5	19.5	14.0	11.0
30	10.5	9.0	---	---	18.5	16.0	21.0	17.5	22.5	20.0	15.0	12.0
31	---	---	---	---	---	---	21.5	18.0	21.0	19.5	---	---
MONTH	17.0	3.0					25.5	15.0			21.5	10.0

04122000 MUSKEGON RIVER AT NEWAYGO, MI

LOCATION.--Lat 43°25'20", long 85°48'04", in NE¼ NE¼ sec.24, T.12 N., R.13 W., Newaygo County, Hydrologic Unit 04060102, on left bank near nonoperative powerplant at Newaygo, 600 ft (183 m) downstream from Penoyer Creek,and at mile 39.1 (62.9 km).

DRAINAGE AREA.--2,350 mi² (6,090 km²), approximately.

PERIOD OF RECORD.--July to December 1908, July 1909 to July 1915, January 1916 to December 1919, October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307. Records for June 1901 to December 1906, published in WSP 129, 170, and 206, have been found to be unreliable and should not be used.

REVISED RECORDS.--WSP 974: 1933, 1935, 1937-38. WSP 1307: 1940(M). See also PERIOD OF RECORD.

GAGE.--Water-stage recorder. Datum of gage is 625.83 ft (190.753 m) National Geodetic Vertical Datum of 1929. October 1930 to January 1939, nonrecording gage, and Jan. 31, 1939, to Sept. 30, 1963, water-stage recorder at present site at datum 40.0 ft (12.192 m) lower.

REMARKS.--Records good. Flow regulated by powerplants above station, the largest of which are at Croton Dam, Hardy Dam (since 1931), and Rogers Dam. Since Dec. 27, 1965, powerplant at Newaygo nonoperative, and in January 1969, dam at Newaygo was removed. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--58 years (water years 1910-14, 1917-19, 1931-80), 1,959 ft³/s (55.48 m³/s), 11.32 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 14,950 ft³/s (423 m³/s) Mar. 25, 1913; minimum, 52 ft³/s (1.47 m³/s) Oct. 2, 1965, gage height, 5.31 ft (1.618 m), result of regulation during pipeline repair; minimum daily, 330 ft³/s (9.35 m³/s) Feb. 15, 1914.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 5,410 ft³/s (153 m³/s) Mar. 21, gage height, 9.94 ft (3.030 m); minimum, 655 ft³/s (18.5 m³/s) Sept. 11, 12, gage height, 6.35 ft (1.935 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1060	1170	1540	2320	1470	1090	2250	2530	1540	1600	1280	1160
2	1060	1170	2210	2430	1770	1090	1890	2270	1440	1460	1180	1250
3	1060	1170	2040	1620	1690	1170	2350	2270	1350	1440	1030	1340
4	1010	1170	1520	1560	1620	1740	1880	2050	1240	1280	1030	1240
5	1070	1170	1600	1470	1760	1170	2750	1830	1350	1370	1030	1040
6	1080	1180	2930	1610	1860	1870	1920	2020	2120	1820	1030	1030
7	1070	1180	2250	1330	1860	1860	2190	2160	2710	1730	1030	1330
8	1090	1470	2250	1570	2170	1500	1990	1840	1710	1020	1290	1030
9	1070	2080	2070	1660	2170	1070	2770	1840	2220	1020	1520	1040
10	1060	1580	1630	1550	1780	1440	3710	1840	2210	1020	1520	1040
11	1300	1300	1320	2090	1460	1070	3730	1590	2020	1020	979	825
12	1430	1300	1530	2270	2170	1560	3720	1830	1420	1190	1400	882
13	1050	1330	2000	2520	2200	1440	3640	1950	1850	1490	1140	2130
14	1050	1440	2070	2620	1750	1430	3590	1440	1180	1030	1200	2220
15	1420	1310	1770	2860	1430	1650	4310	1280	1430	1030	1040	1970
16	1040	1570	1310	2960	2050	2080	4330	1840	1480	1040	1030	1370
17	1420	1540	1290	3050	2150	2260	4250	1760	1410	1030	1030	2580
18	1040	1240	1290	3380	1870	3710	3780	1420	1750	1130	1030	2300
19	1430	1260	1300	3370	2060	3240	3340	2770	1550	1270	1030	1850
20	1420	1550	1550	3350	2170	3740	3390	1870	1350	1240	2010	2150
21	1420	2040	1600	3340	1510	4760	3230	1960	1750	1170	1760	1960
22	1440	2060	1320	3260	1430	4300	2820	1730	1680	1190	1070	2190
23	2230	1610	1580	2750	1890	3780	2290	2040	1520	1030	978	2500
24	3210	1320	2510	2510	2070	3840	1950	1730	1390	1410	716	2350
25	2090	1750	3400	2200	2260	3430	2770	1570	2200	1030	1060	2210
26	1020	2840	2870	1890	2260	2640	2360	1880	1590	1050	1060	1[illegible]
27	1040	3380	2600	1590	2260	2630	1980	1530	1030	1160	1050	1[illegible]
28	1030	2860	2620	2020	2080	2760	2010	1650	1160	1250	1050	[illegible]
29	1020	2260	2660	1860	1830	3180	2250	1580	1280	1140	1050	[illegible]
30	1030	1730	2090	2290	---	2780	2140	1490	1260	1450	1050	[illegible]20
31	1160	---	1880	2290	---	2600	---	1780	---	1460	1050	---
TOTAL	39920	49150	59540	72660	55440	72930	73770	57330	49610	38600	35723	49567
MEAN	1288	1638	1921	2344	1912	2353	2459	1849	1654	1245	115[illegible]	1652
MAX	3210	3380	3400	3380	2260	4760	4330	2770	2710	1820	20[illegible]	2580
MIN	1010	1170	1290	1330	1430	1070	1880	1280	1030	1020	[illegible]	825
CFSM	.55	.70	.82	1.00	.81	1.00	1.22	.79	.70	.53	[illegible]	.70
IN.	.63	.78	.94	1.15	.88	1.15	1.36	.91	.79	.61	[illegible]	.78

CAL YR 1979 TOTAL 791532 MEAN 2169 MAX 6050 MIN 642 CFSM .92 IN 12.53
WTR YR 1980 TOTAL 666260 MEAN 1820 MAX 4760 MIN 716 CFSM .77 IN 10.55

04122030 MUSKEGON RIVER NEAR BRID

(National stream-quality accounting

LOCATION.--Lat 43°19'05", long 85°02'11", in SW¼ NW¼ sec.30, T.11 N , at bridge on Maple Island Road, 5 mi (8 km) southwest of Bridgeton, 13 mi 20 mi (32 km) downstream from gaging station at Newago.

DRAINAGE AREA.--2,420 mi² (6,270 km²), approximately.

PERIOD OF RECORD.--Water years 1974 to current ye

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 ent year.
WATER TEMPERATURES: November 197 ent year.

INSTRUMENTATION.--Water-quali since November 1975.

REMARKS.--In addition to ality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measureme ade at times of monthly sampling. Biological Data (Phytoplankton) is for the 1979-80 water years.

EXTREMES FOR PER LY RECORD.--
SPECIFIC CO : Maximum recorded (water years 1975, 1978-80), 1550 micromhos Sept. 24, 1979; minimum (water years 1975, 1977-80), 69 micro , 1979.
WATER T S: Maximum recordol 33.0°C July 19, 1977 ; minimum, 0.0°C on many days during winter periods.

EXTREM RRENT YEAR.--
S ONDUCTANCE: Maximum, 814 micromhos June 26; minimum, 166 micromhos June 23.
MPERATURES: Maximum, 27.0°C July 11, 20; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
OCT											
23...	0930	1370	390	8.2	13.0	9.0	86	100	62	180	25
NOV											
27...	1330	3460	360	8.2	6.0	--	--	31	45	180	30
JAN											
03...	1400	1890	392	7.6	1.0	13.1	93	K10	K11	180	27
FEB											
06...	1345	1840	365	8.1	.5	13.2	93	<1	K2	180	19
MAR											
11...	1315	1100	378	7.8	1.0	13.5	96	<1	<1	180	26
APR											
16...	1130	4300	335	7.8	4.0	12.9	98	K3	K4	150	24
MAY											
06...	1100	1850	330	8.1	13.5	10.0	98	K4	K5	150	32
JUN											
17...	1445	1020	364	8.0	18.5	9.3	100	K17	K7	150	0
JUL											
23...	1400	1000	328	8.0	23.5	8.4	99	--	K12	160	21
AUG											
21...	1530	2530	315	8.0	22.0	7.2	84	K1050	380	160	23
SEP											
24...	1400	2160	359	8.0	17.5	8.9	94	>240	K20	170	30

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
23...	48	14	12	.4	14	1.0	186	0	153	1.9	23
NOV											
27...	48	14	11	.4	16	1.1	180	0	148	1.8	21
JAN											
03...	47	14	10	.3	16	1.0	180	0	148	4.6	22
FEB											
06...	47	14	10	.3	11	1.1	190	0	156	2.4	22
MAR											
11...	48	15	12	.4	13	1.1	190	0	156	4.8	24
APR											
16...	39	12	10	.4	13	1.6	150	0	123	3.8	17
MAY											
06...	41	12	8.8	.3	11	1.4	150	0	120	1.9	16
JUN											
17...	40	12	9.6	.3	12	1.2	364	0	299	5.8	20
JUL											
23...	43	13	10	.3	12	1.1	180	0	140	2.7	16
AUG											
21...	44	13	9.1	.3	11	1.3	190	0	140	3.0	18
SEP											
24...	45	14	9.5	.3	11	1.1	190	0	140	3.0	15

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)
OCT										
23...	22	.1	5.0	231	218	854	.17	.05	.06	.50
NOV										
27...	19	.1	5.8	228	210	2130	.27	.07	.08	.23
JAN										
03...	16	.1	6.6	203	207	1040	.31	.01	.01	.46
FEB										
06...	18	.1	7.4	216	215	1070	.31	.04	.05	.54
MAR										
11...	22	.1	8.4	235	226	698	.47	.01	.01	.33
APR										
16...	18	.1	6.5	214	180	2480	.52	.09	.11	.77
MAY										
05...	19	.1	4.8	203	176	1010	.26	.05	.06	.61
JUN										
17...	17	.2	4.8	206	285	567	.23	.04	.05	.39
JUL										
23...	18	.1	5.0	212	191	572	.86	.14	.17	.96
AUG										
21...	16	.2	7.1	212	193	1450	.09	.06	.07	.40
SEP										
24...	16	.1	6.5	200	192	1170	.26	.00	.00	.44

DATE	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT										
23...	.55	.72	3.2	.030	.09	.020	--	9	33	100
NOV										
27...	.30	.57	2.5	.040	.12	.010	5.8	19	177	100
JAN										
03...	.47	.78	3.5	.010	.03	.010	--	11	56	100
FEB										
06...	.58	.89	3.9	.020	.06	.030	--	12	60	99
MAR										
11...	.34	.81	3.6	.030	.09	.020	5.6	12	36	100
APR										
16...	.86	1.4	6.1	.040	.12	.010	5.5	34	395	100
MAY										
05...	.66	.92	4.1	.030	.09	.010	10	20	100	100
JUN										
17...	.43	.66	2.9	.030	.09	.010	5.1	10	28	100
JUL										
23...	1.1	2.0	8.7	.160	.49	.010	--	7	19	100
AUG										
21...	.46	.55	2.4	.020	.06	.020	6.7	43	294	100
SEP										
24...	.44	.70	3.1	.060	.18	.030	6.2	27	157	100

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 23...	0930	2	2	100	0	0	0	--	<10	0	2
JAN 03...	1400	2	1	100	40	0	3	10	<10	0	0
FEB 06...	1345	4	1	200	40	0	0	10	10	0	1
JUL 23...	1400	1	1	<50	30	0	1	10	10	0	0

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 23...	--	11	240	40	--	14	40	20	.2	<.1
JAN 03...	5	4	80	30	1	0	10	3	.1	.1
FEB 06...	--	3	160	30	4	0	20	6	.2	.1
JUL 23...	7	0	160	10	0	0	30	3	.1	.1

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT 23...	2	0	0	0	--	0	40	20	4.3	--
JAN 03...	2	1	0	0	0	0	20	20	6.9	.8
FEB 06...	2	0	0	0	0	0	10	10	6.4	.2
JUL 23...	0	0	0	0	0	0	10	0	6.6	.1

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
FEB 06...	1345	31	295	5.24	5.67	1.32	.003
JUL 23...	1400	36	352	13.5	17.3	10.8	2.39

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 15,78	MAR 8,79	MAY 8,79	JUN 6,79	JUL 9,79
TIME	1130	1000	1000	1000	1500
TOTAL CELLS/ML	840	390	1600	940	1700
DIVERSITY: DIVISION	1.8	0.0	1.2	1.6	1.5
.CLASS	2.3	0.0	1.2	1.6	1.0
..ORDER	2.7	0.0	2.1	1.8	0.0
...FAMILY	3.0	2.1	3.0	2.3	0.0
....GENUS	3.1	2.6	3.4	2.4	0.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	100	11	71	4
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	10	1
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	42	3	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	70	4	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	110	13	--	-	42	3	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	65	7	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	--	-	130	14	--	-
....TETRASTRUM	--	-	--	-	56	3	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	56	3	--	-	--	-
...PHACOTACEAE										
....PHACOTUS	44	5	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....GONIUM	--	-	--	-	56	3	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	22	3	--	-	460#	29	26	3	20	1
....MELOSIRA	44	5	--	-	170	10	170#	18	150	9
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	44	5	14	4	--	-	--	-	20	1
....COCCONEIS	--	-	14	4	14	1	--	-	81	5
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	51	3
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	44	5	43	11	--	-	--	-	150	9
...DIATOMACEAE										
....DIATOMA	--	-	170#	44	42	3	52	5	41	2
...FRAGILARIACEAE										
....ASTERIONELLA	22	3	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	14	4	--	-	--	-	51	3
....SYNEDRA	--	-	14	4	220	14	--	-	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	30	2
...NAVICULACEAE										
....NAVICULA	--	-	58	15	130	8	--	-	290#	17
....NEIDIUM	--	-	29	7	--	-	--	-	--	-
....PINNULARIA	--	-	14	4	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	22	3	14	4	110	7	--	-	51	3
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	71	4
....OCHROMONAS	220#	26	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	51	3
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	13	1	290#	17
...CRYPTOMONADACEAE										
....CRYPTOMONAS	22	3	--	-	110	7	--	-	61	4

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATF TIME	NOV 15,78 1130		MAR 6,79 1000		MAY 8,79 1000		JUN 6,79 1000		JUL 9,79 1500	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	200#	24	--	-	--	-	390#	41	51	3
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	100	6
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	22	3	--	-	--	-	--	-	20	1
....TRACHELOMONAS	22	3	--	-	14	1	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	14	1	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 8,79	SEP 18,79	NOV 27,79	MAR 11,80	MAY 6,80
TIME	1115	1000	1330	1315	1100
TOTAL CELLS/ML	490	540	2600	400	2600
DIVERSITY: DIVISION	1.8	1.5	1.2	1.1	1.1
.CLASS	1.8	1.7	1.2	1.1	1.1
..ORDER	2.5	2.1	0.0	1.3	1.8
...FAMILY	2.6	3.1	0.0	2.1	2.7
....GENUS	2.9	3.2	0.0	2.2	3.3

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	240	9
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	69	13	20	1	5	1	120	5
....CHLORELLA	--	-	--	-	--	-	5	1	69	3
....CHODATELLA	--	-	--	-	--	-	--	-	69	3
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	69	3
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	69	3
...SCENEDESMACEAE									69	3
....SCENEDESMUS	52	11	--	-	79	3	--	-	100	4
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	52	11	14	3	--	-	--	-	34	1
...PHACOTACEAE										
....PHACOTUS	--	-	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	78#	16	55	10	980#	37	--	-	770#	30
....MELOSIRA	13	3	--	-	39	1	--	-	100	4
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	15	4	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	55	10	59	2	--	-	34	1
....COCCONEIS	--	-	--	-	120	4	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	41	8	--	-	--	-	--	-
....CYMBELLA	--	-	41	8	59	2	5	1	17	1
...DIATOMACEAE										
....DIATOMA	--	-	27	5	--	-	10	2	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	79	3	20	5	310	12
....FRAGILARIA	130#	26	--	-	20	1	--	-	--	-
....SYNEDRA	26	5	--	-	--	-	5	1	17	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	120	4	5	1	--	-
...NAVICULACEAE										
....NAVICULA	--	-	55	10	330	13	96#	24	17	1
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	14	3	98	4	25	6	450#	17
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	14	3	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	20	1	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	39	8	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	39	8	--	-	160	6	--	-	34	1

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 8,79 1115		SEP 18,79 1000		NOV 27,79 1330		MAR 11,80 1315		MAY 6,80 1100	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	65	13	140#	26	39	1	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	210#	52	--	-
....SCHIZOTHRIX	--	-	--	-	410#	16	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	14	3	--	-	--	-	34	1

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 17,80 1445	JUL 23,80 1400	AUG 21,80 1530	SEP 24,80 1400
TOTAL CELLS/ML	890	1300	620	2800
DIVERSITY: DIVISION	1.3	1.5	1.3	1.6
.CLASS	1.3	1.5	1.3	1.6
..ORDER	1.4	1.8	2.2	2.4
...FAMILY	2.2	2.1	2.8	2.7
....GENUS	2.2	2.1	3.1	2.8

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	39	4	--	-	13	2	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	13	1	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	13	1	13	1	--	-	*	0
....CHLORELLA	13	1	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	13	1	26	4	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	130	10	77	13	77	3
....TETRASTRUM	--	-	--	-	--	-	--	-
..TETRASPORALES								
...PALMELLACEAE								
....SPHAEROCYSTIS	13	1	100	8	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	13	1	52	4	90	15	--	-
...PHACOTACEAE								
....PHACOTUS	--	-	--	-	--	-	--	-
...VOLVOCACEAE								
....GONIUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	--	-	--	-	52	8	39	1
....MELOSIRA	--	-	--	-	140#	23	720#	26
....STEPHANODISCUS	--	-	--	-	--	-	*	0
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	13	1	--	-	26	4	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	100	12	26	2	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	270	10
....SYNEDRA	--	-	--	-	77	13	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	64	10	51	2
....NEIDIUM	--	-	--	-	--	-	--	-
....PINNULARIA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	13	1	13	1	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	490#	55	130	10	--	-	320	12
...CRYPTOMONADACEAE								
....CRYPTOMONAS	140#	16	26	2	--	-	*	0

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 17,80		JUL 23,80		AUG 21,80		SEP 24,80	
TIME	1445		1400		1530		1400	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	39	4	--	-	52	8	480#	17
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	210	7
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	770#	60	--	-	570#	20
....SCHIZOTHRIX	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	470	450	458	502	493	499	397	387	391	390	386	388
2	488	442	460	504	497	500	399	385	391	393	390	392
3	439	419	426	501	496	498	388	379	385	396	390	392
4	434	413	422	500	494	497	382	378	379	405	395	401
5	433	414	420	497	491	494	395	379	387	398	396	397
6	430	410	417	498	491	494	397	383	390	398	391	395
7	420	407	412	491	484	487	384	373	378	432	392	413
8	417	408	411	484	476	480	381	375	378	454	423	431
9	416	407	412	476	473	474	380	374	377	421	409	416
10	457	403	416	469	466	467	389	381	383	417	405	411
11	403	398	400	463	458	461	407	390	398	407	388	398
12	407	394	400	456	451	453	412	408	411	417	388	404
13	401	395	397	448	444	446	410	398	403	426	404	415
14	402	392	397	440	435	437	401	396	399	417	400	406
15	397	387	392	432	428	429	397	392	395	404	386	397
16	398	391	394	425	420	422	401	395	399	402	386	392
17	396	382	388	421	413	415	402	397	400	400	384	389
18	383	372	377	415	409	412	404	400	402	405	399	403
19	378	371	375	408	406	407	411	402	406	404	392	399
20	398	375	390	405	401	404	412	407	410	394	385	390
21	393	375	384	400	392	397	409	402	406	393	383	388
22	399	385	394	407	386	394	405	401	403	390	377	383
23	390	385	388	409	400	408	414	404	407	383	361	372
24	484	465	476	404	400	402	430	412	423	379	362	369
25	488	479	484	397	390	394	413	387	397	365	360	363
26	487	481	484	390	386	388	390	387	388	371	364	369
27	488	481	483	391	379	384	393	389	391	379	369	375
28	490	482	485	390	379	385	395	392	393	374	354	366
29	489	483	485	384	380	383	395	391	393	364	355	359
30	494	484	488	386	382	383	392	387	390	371	360	365
31	497	485	491	---	---	---	391	388	389	371	360	365
MONTH	497	371	426	504	379	436	430	373	395	454	354	390

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	383	364	374	378	367	374	346	340	342	337	334	336
2	366	354	361	385	372	380	344	338	341	340	334	337
3	369	356	364	372	366	369	346	343	345	343	334	340
4	380	361	369	379	369	374	344	338	342	345	343	344
5	377	361	369	385	374	380	339	333	336	348	346	347
6	375	358	367	379	368	371	338	333	336	354	345	346
7	374	357	363	375	369	373	338	334	337	311	309	310
8	375	357	366	377	371	374	338	334	337	318	315	317
9	369	354	361	390	367	377	337	336	337	326	322	324
10	376	359	369	391	378	383	337	334	335	331	328	330
11	379	363	375	387	376	380	336	333	334	330	327	328
12	368	356	363	390	379	385	336	334	334	338	327	330
13	365	354	360	390	377	383	334	330	331	338	325	334
14	368	359	363	395	380	387	332	329	331	338	333	335
15	376	358	369	396	386	390	330	326	329	338	332	335
16	370	362	368	393	384	389	326	321	324	336	333	334
17	373	361	367	390	375	386	326	322	324	336	331	334
18	389	369	377	374	367	369	330	321	325	342	337	339
19	388	377	384	373	364	370	331	327	329	338	331	335
20	377	368	373	361	351	355	331	327	330	340	336	339
21	379	371	375	354	319	333	331	327	329	341	337	340
22	389	379	384	326	318	322	331	328	330	330	325	328
23	381	374	377	327	325	326	331	328	329	320	312	316
24	377	368	374	329	326	328	333	330	332	309	305	307
25	371	363	367	332	326	329	336	332	334	313	305	309
26	369	357	363	339	330	333	340	337	338	311	303	307
27	364	355	359	340	338	339	342	338	340	314	310	312
28	364	353	358	342	340	340	343	338	340	319	313	316
29	367	355	361	345	340	342	343	337	340	317	310	314
30	---	---	---	345	341	344	339	335	337	324	311	315
31	---	---	---	351	344	347	---	---	---	319	302	309
MONTH	389	353	368	396	318	362	346	321	334	354	302	327

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	318	313	316	388	362	377	301	291	295	375	367	373
2	330	318	322	378	341	356	315	292	307	376	370	328
3	340	331	335	350	340	347	317	310	315	374	365	370
4	337	331	334	342	317	324	308	298	303	378	375	377
5	340	333	337	332	323	329	302	296	299	383	371	377
6	338	324	331	333	326	329	300	298	299	379	373	377
7	328	296	313	345	330	338	297	287	291	379	370	374
8	270	250	256	347	301	316	290	269	278	377	373	375
9	299	221	252	322	304	311	301	271	284	376	373	375
10	353	258	311	344	320	332	303	284	295	379	367	373
11	342	311	331	381	342	364	291	284	288	373	369	371
12	342	330	338	383	305	341	328	275	301	375	370	373
13	340	327	335	312	304	308	357	329	350	374	366	371
14	336	326	333	320	304	312	356	342	350	370	367	369
15	359	344	354	308	291	298	373	355	364	368	366	367
16	369	346	356	304	289	297	384	372	378	365	355	360
17	370	332	356	317	301	307	396	382	387	353	344	348
18	312	296	306	340	315	326	393	359	370	361	344	350
19	330	282	306	353	337	345	367	357	361	356	348	352
20	366	315	352	361	351	355	368	353	361	361	355	358
21	348	337	343	362	345	353	354	317	336	359	355	356
22	283	230	255	343	334	338	367	323	346	360	354	356
23	286	166	237	334	322	330	394	353	375	361	355	357
24	282	167	216	327	318	323	403	373	390	364	347	359
25	341	172	269	323	318	321	400	380	389	416	364	401
26	814	343	591	325	320	323	396	375	385	399	382	389
27	360	346	354	318	303	307	386	370	378	399	391	395
28	363	348	356	333	309	315	384	372	378	409	400	403
29	383	349	356	334	326	329	380	370	374	433	411	420
30	383	376	380	326	322	323	377	366	371	465	438	454
31	---	---	---	320	295	296	377	367	372	---	---	---
MONTH	814	166	328	388	289	328	403	269	341	465	344	374

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	18.0	19.0	11.5	9.0	10.5	4.0	3.0	3.5	3.0	2.0	2.5
2	19.0	18.0	18.5	8.5	7.5	8.0	3.5	3.0	3.0	3.0	2.5	3.0
3	18.0	17.5	18.0	7.5	7.0	7.5	3.5	3.0	3.0	2.0	.5	1.5
4	17.5	16.5	17.0	8.0	7.0	7.5	3.5	3.0	3.0	1.0	.5	1.0
5	17.0	15.5	16.0	8.5	7.5	8.0	4.5	3.5	4.0	1.5	.5	1.0
6	16.5	15.5	16.0	8.5	7.5	8.0	4.0	3.5	4.0	.5	.0	.5
7	16.0	14.5	15.5	7.5	6.0	7.0	4.0	3.5	3.5	.0	.0	.0
8	15.0	14.0	14.5	7.0	5.5	6.5	3.5	2.5	3.0	.0	.0	.0
9	15.0	14.0	14.5	5.5	5.5	5.5	3.0	2.5	3.0	.0	.0	.0
10	14.5	13.5	14.0	6.0	5.5	5.5	4.0	3.0	3.5	.5	.0	.0
11	13.5	13.0	13.0	5.5	4.5	5.0	4.5	4.0	4.5	.5	.0	.0
12	13.5	12.0	13.0	5.5	5.0	5.0	4.5	2.5	4.0	.0	.0	.0
13	12.5	11.5	12.0	5.5	5.0	5.0	2.5	1.0	1.5	.5	.0	.0
14	12.5	11.5	11.5	5.5	4.5	5.0	2.5	1.5	2.0	1.5	.5	1.0
15	13.5	11.5	12.5	5.5	5.0	5.5	2.5	1.5	2.0	1.5	1.5	1.5
16	13.5	13.0	13.5	5.0	4.5	4.5	3.0	1.0	2.5	3.0	1.5	2.0
17	14.5	13.0	14.0	6.0	5.0	5.5	1.0	.0	.5	3.0	2.5	3.0
18	15.0	14.0	14.5	6.5	5.0	5.5	.5	.0	.0	2.5	2.0	2.5
19	16.0	14.5	15.5	7.5	6.0	6.5	1.5	.5	1.0	2.0	1.5	2.0
20	15.5	15.0	15.0	7.5	6.0	7.0	1.0	.5	1.0	1.5	1.0	1.5
21	17.0	16.0	16.5	7.0	6.0	6.5	2.0	.5	1.5	1.5	1.0	1.5
22	17.0	16.5	17.0	8.0	7.0	7.5	3.5	2.0	3.0	2.0	1.5	2.0
23	16.5	15.5	16.0	8.0	6.5	7.0	4.0	3.5	3.5	1.5	.5	1.0
24	11.5	11.0	11.5	6.5	5.5	6.0	4.0	4.0	4.0	.5	.0	.5
25	11.5	10.5	11.0	5.5	5.0	5.5	4.0	3.0	3.5	1.5	.5	1.0
26	10.5	8.5	9.5	6.5	5.5	6.0	3.0	2.5	3.0	.5	.0	.5
27	9.0	8.0	8.5	6.5	6.0	6.0	3.0	2.5	3.0	.5	.0	.5
28	9.5	8.5	9.0	6.0	5.0	5.5	3.0	2.5	2.5	.5	.0	.5
29	9.5	8.0	8.5	5.0	4.5	4.5	3.0	1.5	2.5	.5	.0	.5
30	10.0	8.0	9.0	4.5	4.0	4.5	2.5	1.5	2.0	.5	.0	.5
31	11.0	8.5	10.0	---	---	---	2.0	1.5	1.5	.5	.0	.0
MONTH	19.5	8.0	13.5	11.5	4.0	6.5	4.5	.0	2.5	3.0	.0	1.0

04122030 MUSKEGON RIVER NEAR BRIDGETON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.5	.0	.0	.5	.5	.5	5.0	3.5	4.5	12.0	10.5	11.0
2	1.0	.0	.5	.5	.5	.5	7.0	5.0	6.0	13.0	11.0	12.0
3	1.0	.0	.5	.5	.5	.5	6.5	4.0	5.5	13.5	11.5	12.5
4	.5	.0	.5	2.0	.5	1.5	5.0	4.0	4.5	15.5	13.0	14.0
5	.5	.0	.0	3.0	1.0	2.0	6.0	4.5	5.0	16.0	14.5	15.0
6	1.5	.0	1.0	1.0	.5	1.0	6.5	6.0	6.0	15.5	14.0	14.5
7	1.5	.5	1.0	2.5	1.0	1.5	6.0	5.5	6.0	14.0	12.0	13.0
8	1.0	.5	.5	3.5	2.0	2.5	8.0	6.0	7.0	12.5	11.0	11.5
9	2.0	1.0	1.5	4.0	1.5	3.0	7.0	6.0	6.5	12.5	11.0	11.5
10	1.0	.5	1.0	4.0	1.5	3.0	6.0	5.0	5.5	12.5	11.5	12.0
11	1.0	.5	.5	2.0	.5	1.5	6.0	5.0	5.5	14.5	12.0	13.0
12	1.0	.5	.5	1.5	.5	1.0	6.0	5.0	5.5	15.0	13.5	14.5
13	1.0	1.0	1.0	2.0	1.0	1.0	5.5	4.0	5.0	14.5	12.0	13.5
14	2.5	1.0	1.5	4.0	1.0	2.5	6.0	4.0	4.5	14.0	11.5	12.5
15	2.0	1.0	1.5	4.5	2.0	3.5	4.5	4.0	4.5	15.5	12.5	14.0
16	1.0	.5	1.0	4.5	3.0	3.5	5.5	4.0	4.5	14.0	12.5	13.5
17	.5	.5	.5	4.5	2.5	4.0	5.5	4.5	5.0	14.0	12.5	13.5
18	1.5	.5	1.0	3.5	1.5	2.5	8.0	5.0	6.0	14.5	13.0	14.0
19	2.5	1.5	2.0	4.0	2.5	3.5	8.5	6.5	7.5	14.5	13.0	14.0
20	2.5	2.5	2.5	4.5	3.5	4.0	9.0	7.0	8.0	16.5	14.5	15.5
21	3.5	2.5	3.0	4.5	3.0	3.5	10.5	8.5	9.5	17.5	15.5	16.5
22	3.5	2.5	3.0	4.0	2.0	3.0	11.0	9.0	10.0	17.5	16.0	17.0
23	3.0	2.0	2.5	4.0	3.0	3.5	11.0	9.5	10.5	17.5	16.5	17.0
24	2.5	2.0	2.0	3.5	2.5	3.0	10.5	8.0	9.5	18.5	17.0	17.5
25	1.5	1.0	1.5	4.0	2.0	3.0	10.5	8.5	9.5	20.0	17.0	18.5
26	1.0	.5	.5	4.5	3.0	4.0	11.0	9.5	10.0	19.0	17.0	18.0
27	2.0	1.0	1.0	4.5	3.5	4.0	10.5	9.5	10.0	19.5	17.0	18.0
28	1.5	1.0	1.5	4.5	3.5	4.0	10.0	9.5	10.0	18.0	16.5	17.5
29	1.0	.5	.5	4.5	3.5	4.0	10.5	10.0	10.0	17.5	17.0	17.5
30	---	---	---	4.5	3.5	4.0	10.5	10.0	10.5	18.5	17.0	18.0
31	---	---	---	4.5	4.0	4.0	---	---	---	18.0	16.5	17.5
MONTH	3.5	.0	1.0	4.5	.5	2.5	11.0	3.5	7.0	20.0	10.5	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	16.5	15.5	16.0	22.0	19.0	20.5	25.0	22.0	23.5	23.0	21.5	22.0
2	17.5	15.5	16.5	22.0	19.5	20.5	23.5	21.5	23.0	23.0	22.0	22.5
3	20.5	17.5	18.5	24.5	20.5	22.5	24.5	20.5	22.5	24.0	21.0	22.5
4	20.0	17.5	19.0	23.5	21.0	22.5	25.0	22.0	23.0	23.0	22.0	22.5
5	18.5	17.0	18.0	25.0	22.0	23.0	24.5	23.0	23.5	23.5	21.0	22.0
6	19.0	17.0	17.5	23.5	21.0	22.0	24.0	21.5	22.5	23.5	20.5	22.0
7	18.5	17.5	18.0	22.5	21.5	22.0	25.0	22.5	23.5	23.5	20.5	22.0
8	18.0	16.5	17.5	25.0	22.0	23.5	25.5	23.0	23.5	24.0	21.5	22.5
9	17.5	16.5	17.0	24.5	22.5	23.5	24.0	23.0	23.5	23.5	21.5	22.5
10	17.0	16.0	16.5	26.0	21.5	23.5	23.0	22.0	23.0	22.0	19.0	20.5
11	17.5	16.0	16.5	27.0	23.5	24.5	22.5	22.0	22.5	20.5	18.5	19.5
12	18.5	17.0	17.5	25.5	23.5	24.0	24.0	21.0	22.5	19.0	18.5	19.0
13	19.0	17.5	18.0	25.0	22.5	23.5	22.5	20.5	21.5	22.0	18.5	20.0
14	20.5	18.5	19.5	26.5	23.5	24.5	23.5	20.0	21.5	21.5	19.5	20.5
15	19.5	17.0	18.5	25.0	23.5	24.5	24.0	21.5	22.5	19.5	19.0	19.0
16	19.5	16.5	18.0	25.0	23.0	24.0	23.0	20.0	21.5	19.0	18.0	18.5
17	20.5	17.5	18.5	26.0	23.5	24.5	21.0	19.5	20.5	18.0	17.0	17.5
18	18.5	17.5	18.0	24.5	23.0	23.5	23.5	19.5	21.5	18.5	17.5	18.0
19	18.0	16.0	17.5	26.0	23.0	24.0	23.5	21.5	22.5	19.0	17.5	18.0
20	19.0	15.5	17.0	27.0	24.5	25.0	22.5	20.5	21.5	19.0	18.5	19.0
21	19.0	18.0	18.5	24.5	23.0	24.0	24.0	22.0	22.5	19.5	19.0	19.0
22	21.5	18.5	19.5	25.0	22.5	23.5	24.0	21.5	22.5	19.0	18.0	18.5
23	22.0	19.0	20.0	25.5	23.0	23.5	24.5	21.0	22.5	18.5	17.5	18.0
24	22.0	20.5	21.0	25.5	21.5	23.5	25.0	21.0	23.0	18.0	17.0	17.5
25	22.0	21.0	21.5	24.0	22.0	23.0	23.5	21.5	22.5	18.0	17.0	17.5
26	21.5	21.0	21.5	23.0	21.0	22.0	24.5	21.0	22.5	17.0	16.0	17.0
27	24.5	21.0	22.5	22.5	20.5	21.5	25.0	22.5	23.5	16.0	15.5	15.5
28	24.0	20.5	22.0	24.5	21.5	22.5	25.0	23.0	23.5	16.5	15.5	16.0
29	23.0	20.5	22.0	25.0	23.0	23.5	26.0	23.5	24.5	17.5	15.5	16.5
30	22.0	19.0	20.0	23.0	21.5	22.0	24.5	23.0	24.0	17.5	16.5	17.0
31	---	---	---	23.5	21.0	22.0	23.0	22.0	23.0	---	---	---
MONTH	24.5	15.5	18.5	27.0	19.0	23.0	26.0	19.5	22.5	24.0	15.5	19.5

04122100 BEAR CREEK NEAR MUSKEGON, MI

LOCATION.--Lat 43°17'19", long 86°13'22", in SW¼ NW¼ sec.4, T.10 N., R.16 W., Muskegon County, Hydrologic Unit 04060102, on left bank at upstream side of bridge on North Getty Street, 1.5 mi (2.4 km) upstream from Little Bear Creek, and 3.9 mi (6.3 km) northeast of Muskegon.

DRAINAGE AREA.--14.8 mi^2 (38.3 km^2).

PERIOD OF RECORD.--October 1965 to current year.

GAGE.--Water-stage recorder. Datum of gage is 590.00 ft (179.832 m) Michigan Department of Natural Resources datum. Prior to Mar. 17, 1978, at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation during low flow by dams and irrigation above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 15.8 ft^3/s (0.447 m^3/s), 14.50 in/yr (368 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 930 ft^3/s (26.3 m^3/s), revised, Mar. 5, 1976, gage height, 11.00 ft (3.353 m), datum then in use; minimum, 1.0 ft^3/s (0.028 m^3/s) Aug. 5, 17, 22, 1971.

EXTREMES FOR CURRENT YEAR.--Peak discharge above base of 100 ft^3/s (2.83 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 25	0800	113	3.20	14.11	4.301	Apr. 9	0700	154	4.36	14.53	4.429
Jan. 17	1300	103	2.92	13.89	4.234	Aug. 20	2000	*468	13.3	*16.29	4.965

Minimum discharge, 3.0 ft^3/s (0.085 m^3/s) Oct. 18, 19, Aug. 5; minimum gage height, 10.38 ft (3.164 m) Oct. 1.

REVISIONS.--The peak discharges and annual maximum (*) for water years 1976, 1978 and 1979 have been revised as shown in the following table. They supersede figures published in the reports for 1976, 1978 and 1979.

Water year	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Water year	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
1976	Mar. 5, 1976	1100	*930	26.3	*11.00	3.353	1979	Mar. 19, 1979	0200	134	3.79	14.23	4.337
1978	Aug. 19, 1978	1500	*233	6.60	*15.11	4.606	1979	Mar. 30, 1979	1500	128	3.62	14.16	4.316
1979	Mar. 5, 1979	0200	ice jam		*15.45	4.709	1979	Apr. 26, 1979	1700	*151	4.28	14.41	4.392
1979	Mar. 7, 1979	0500	136	3.85	14.25	4.343							

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.6	6.6	12	15	9.9	11	14	21	8.3	5.9	4.4	6.6
2	3.7	5.4	11	15	9.8	10	12	18	8.9	5.5	4.4	6.6
3	4.2	4.7	10	14	9.6	9.5	13	16	10	5.0	4.5	6.6
4	4.7	4.4	10	13	9.5	9.0	46	15	8.1	4.9	3.8	6.8
5	4.5	4.3	12	12	9.5	8.5	45	14	8.9	10	3.9	7.0
6	5.8	4.9	13	11	9.4	8.0	27	13	18	6.9	3.8	7.0
7	6.5	5.1	16	10	9.3	7.5	22	13	36	5.6	4.0	6.8
8	4.8	6.0	18	9.5	9.2	7.5	43	12	43	5.0	33	6.6
9	5.7	5.6	13	9.5	9.0	7.5	129	12	22	4.3	18	6.4
10	5.3	5.5	12	10	8.9	8.0	79	10	16	4.5	11	6.2
11	7.2	5.6	12	15	8.8	8.7	45	10	13	4.2	10	6.2
12	7.4	5.4	13	20	8.6	8.6	43	8.8	12	4.9	11	6.6
13	5.5	6.2	11	19	8.5	8.0	37	12	10	5.0	8.7	7.0
14	4.5	6.0	9.6	18	8.4	7.5	33	13	22	4.3	8.2	7.5
15	4.1	7.5	9.0	18	8.3	8.0	45	12	15	6.7	7.1	8.0
16	3.6	7.4	9.0	22	8.2	10	40	12	13	8.6	6.3	9.0
17	3.5	6.5	9.0	79	8.2	26	30	11	11	6.4	6.5	10
18	3.1	5.9	8.7	58	8.2	23	28	22	9.8	5.4	6.4	11
19	4.7	5.7	8.4	36	8.2	19	25	17	11	5.1	7.5	12
20	6.0	5.4	7.9	26	8.2	20	23	13	12	4.7	282	14
21	5.2	9.9	7.5	21	8.2	23	21	11	9.5	5.8	286	20
22	5.4	17	9.8	18	10	17	20	9.5	8.4	5.8	79	30
23	11	15	22	16	21	16	18	8.7	7.8	4.8	40	70
24	8.9	11	32	14	19	15	19	8.4	6.9	3.9	20	45
25	6.4	9.6	85	13	18	13	20	7.7	6.8	3.9	15	33
26	5.4	26	44	12	16	12	18	6.9	6.2	7.6	12	29
27	5.2	19	28	11	14	12	18	6.6	6.1	8.2	10	24
28	5.9	16	23	11	13	12	20	6.1	7.0	6.3	8.0	21
29	4.8	13	19	10	12	11	26	6.8	6.5	5.4	7.0	19
30	4.4	13	17	10	---	11	23	7.4	6.3	4.8	6.7	17
31	4.2	---	15	10	---	12	---	10	---	4.8	6.6	---
TOTAL	165.2	263.6	526.9	576.0	308.9	379.3	982	363.9	379.5	174.2	934.8	465.9
MEAN	5.33	8.79	17.0	18.6	10.7	12.2	32.7	11.7	12.7	5.62	30.2	15.5
MAX	11	26	85	79	21	26	129	22	43	10	286	70
MIN	3.1	4.3	7.5	9.5	8.2	7.5	12	6.1	6.1	3.9	3.8	6.2
CFSM	.36	.59	1.15	1.26	.72	.82	2.21	.79	.86	.38	2.04	1.05
IN.	.42	.66	1.32	1.45	.78	.95	2.47	.91	.95	.44	2.35	1.17

CAL YR 1979 TOTAL 6240.0 MEAN 17.1 MAX 104 MIN 2.7 CFSM 1.16 IN 15.68
WTR YR 1980 TOTAL 5520.2 MEAN 15.1 MAX 286 MIN 3.1 CFSM 1.02 IN 13.87

04122200 WHITE RIVER NEAR WHITEHALL, MI

LOCATION.--Lat 43°27'51", long 86°13'57", in SE¼ NW¼ sec.4, T.12 N., R.16 W., Muskegon County, Hydrologic Unit 04060101, on right bank 30 ft (9 m) downstream from bridge on Fruitvale Road, 6.3 mi (10.1 km) downstream from North Branch, and 6.9 mi (11.1 km) northeast of Whitehall.

DRAINAGE AREA.--380 mi² (980 km²), approximately.

PERIOD OF RECORD.--August 1957 to current year.

GAGE.--Water-stage recorder. Datum of gage is 594.1 ft (181.1 m) National Geodetic Vertical Datum of 1929. Nov. 18, 1957, to Oct. 22, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation during low flow by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--23 years, 426 ft³/s (12.06 m³/s), 15.22 in/yr (387 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,400 ft³/s (153 m³/s) Sept. 1, 1975, gage height, 7.46 ft (2.274 m); minimum, 163 ft³/s (4.62 m³/s) Aug. 18, 19, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,040 ft³/s (57.8 m³/s) Aug. 21, gage height, 5.95 ft (1.814 m); minimum, 231 ft³/s (6.54 m³/s) July 25, 26, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	249	345	534	488	360	350	479	512	322	287	255	400
2	251	358	477	451	340	350	478	496	319	278	248	483
3	256	356	436	433	330	350	470	468	322	267	250	490
4	265	343	411	417	310	350	492	444	316	257	244	437
5	272	336	402	390	300	350	534	426	309	270	247	378
6	276	336	433	370	300	350	573	408	335	275	249	348
7	291	344	426	350	300	350	538	390	398	266	247	329
8	296	355	450	340	300	350	535	380	438	261	294	317
9	307	354	486	350	300	348	648	375	462	253	384	319
10	317	355	461	400	300	347	1110	372	438	249	402	332
11	322	349	429	500	300	341	1010	369	401	244	341	326
12	337	344	418	600	300	322	873	365	362	240	318	318
13	346	346	412	740	300	321	830	371	338	240	306	336
14	339	348	393	650	300	366	811	402	340	235	289	432
15	328	356	377	620	300	337	755	425	332	234	273	560
16	316	369	372	650	300	337	781	407	316	248	263	497
17	308	378	353	700	300	429	796	385	304	264	262	475
18	302	366	356	1110	300	801	708	393	295	251	260	617
19	309	356	388	1130	310	891	638	438	301	243	251	763
20	341	349	414	1000	320	773	585	444	319	245	509	669
21	370	355	411	819	340	784	535	421	312	269	1540	590
22	374	399	377	705	360	830	498	387	303	268	1650	594
23	381	462	391	650	400	791	468	365	290	257	1070	625
24	416	511	463	550	432	718	443	353	277	244	728	791
25	436	492	608	450	423	678	429	343	275	238	487	733
26	417	486	1060	420	402	627	426	332	269	269	392	623
27	384	537	1000	410	385	564	427	322	266	332	364	543
28	365	654	818	400	370	521	436	315	276	324	350	477
29	355	629	712	390	360	499	460	314	308	293	395	436
30	344	576	640	380	---	488	490	318	300	271	399	411
31	338	---	559	370	---	483	---	321	---	260	368	---
TOTAL	10208	12144	15437	17233	9642	15396	18256	12061	9843	8132	13635	14649
MEAN	329	405	498	556	332	497	609	389	328	262	440	488
MAX	436	654	1060	1130	432	891	1110	512	462	332	1650	791
MIN	249	336	353	340	300	321	426	314	266	234	244	317
CFSM	.87	1.07	1.31	1.46	.87	1.31	1.60	1.02	.86	.69	1.16	1.28
IN.	1.00	1.19	1.51	1.69	.94	1.51	1.79	1.18	.96	.80	1.33	1.43

CAL YR 1979 TOTAL 190807 MEAN 523 MAX 1800 MIN 249 CFSM 1.38 IN 18.68
WTR YR 1980 TOTAL 156636 MEAN 428 MAX 1650 MIN 234 CFSM 1.13 IN 15.33

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI

LOCATION.--Lat 43°56'42", long 86°16'43", in NW¼ NW¼ sec.19, T.18 N., R.16 W., Mason County, Hydrologic Unit 04060101, on right bank 20 ft (6 m) upstream from highway bridge at south edge of Scottville, 1.4 mi (2.3 km) upstream from India Creek and 5.6 mi (9.0 km) downstream from Big South Branch.

DRAINAGE AREA.--681 mi² (1,764 km²), revised.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--August 1939 to current year. Prior to October 1942, published as "at Custer".

REVISED RECORDS.--WSP 1437: 1941(M), 1943(M), 1949(M), 1950.

GAGE.--Water-stage recorder. Datum of gage is 597.66 ft (182.167 m) National Geodetic Vertical Datum of 1929. Prior to June 12, 1943, nonrecording gage at bridge 4.5 mi (7.2 km) upstream at different datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Some regulation at low flow.

AVERAGE DISCHARGE.--41 years, 661 ft³/s (18.72 m³/s), 13.18 in/yr (335 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,970 ft³/s (84.1 m³/s) July 1, 1969, gage height, 6.26 ft (1.908 m); minimum, 209 ft³/s (5.92 m³/s) Dec. 11, 1962, discharge measurement; minimum daily, 310 ft³/s (8.78 m³/s) Aug. 9, 10, 1941.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,510 ft³/s (42.8 m³/s) Apr. 12, gage height, 4.23 ft (1.289 m); maximum gage height, 4.96 ft (1.512 m) Jan. 27, backwater from ice; minimum discharge, 402 ft³/s (11.4 m³/s) Oct. 2; minimum gage height, 1.75 ft (0.533 m) Aug. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	403	594	916	880	630	590	929	869	591	534	439	648
2	404	591	841	823	630	590	898	872	588	513	433	724
3	406	591	776	773	630	580	876	833	586	497	429	771
4	413	581	738	725	630	580	877	792	578	484	420	742
5	420	567	734	670	630	580	871	763	577	517	431	672
6	424	569	717	620	630	580	873	728	686	515	423	599
7	438	575	748	620	630	580	863	699	943	500	420	559
8	452	596	785	640	630	580	907	674	1190	481	461	530
9	484	600	794	660	630	570	1060	660	1210	468	499	515
10	492	604	783	670	630	560	1210	655	1110	457	517	519
11	511	595	747	680	630	560	1380	652	996	447	506	519
12	529	588	743	700	630	540	1490	644	866	434	521	511
13	552	594	743	700	630	540	1370	661	766	426	507	556
14	563	591	720	710	620	550	1260	703	701	432	490	637
15	546	606	663	720	620	560	1230	738	655	434	467	811
16	522	614	653	710	620	562	1210	744	628	468	448	1010
17	504	622	660	700	620	695	1180	708	604	481	434	1230
18	496	618	660	690	620	846	1150	718	584	471	429	1210
19	514	607	660	690	610	999	1090	743	628	449	425	1250
20	544	593	660	680	610	1190	1020	793	634	474	679	1370
21	571	595	660	680	610	1320	964	770	651	517	820	1330
22	589	636	632	670	610	1360	915	710	616	531	925	1240
23	614	697	646	660	600	1420	863	663	576	496	938	1220
24	668	753	724	650	600	1380	818	635	553	463	788	1270
25	716	780	927	640	600	1250	775	622	540	442	670	1330
26	690	809	1080	630	600	1150	749	602	523	440	630	1290
27	651	846	1200	630	590	1080	737	582	512	486	611	1150
28	634	922	1260	630	590	1030	746	568	548	507	604	1050
29	612	1020	1160	630	590	993	783	565	553	489	594	975
30	596	1000	1040	630	---	968	822	572	558	461	584	904
31	578	---	946	630	---	946	---	597	---	448	575	---
TOTAL	16536	19954	25016	21141	17900	25729	29916	21535	20751	14762	17117	27142
MEAN	533	665	807	682	617	830	997	695	692	476	552	905
MAX	716	1020	1260	880	630	1420	1490	872	1210	534	938	1370
MIN	403	567	632	620	590	540	737	565	512	426	420	511
CFSM	.78	.98	1.19	1.00	.91	1.22	1.46	1.02	1.02	.70	.81	1.33
IN.	.90	1.09	1.37	1.15	.98	1.41	1.63	1.18	1.13	.81	.94	1.48

CAL YR 1979 TOTAL 316010 MEAN 866 MAX 2790 MIN 403 CFSM 1.27 IN 17.26
WTR YR 1980 TOTAL 257499 MEAN 704 MAX 1490 MIN 403 CFSM 1.03 IN 14.07

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: May 1968 to current year.

INSTRUMENTATION.--Temperature recorder since May 1968.

REMARKS.--Temperature recorder clock stopped Mar. 17-19 (range in temperature 2.0 to 4.0°C), Apr. 25 to June 10 (range in temperature 8.0 to 18.5°C), temperature recorder malfunctioned June 11 to July 22 (range in temperature 12.5 to 23.0°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 21.5°C Aug. 8, 9; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	14.5	13.0	10.0	9.5	2.5	2.0	.5	.0	.0	.0	.5	.5
2	13.0	13.0	9.5	8.5	2.0	1.5	1.0	.5	.0	.0	.5	.5
3	13.0	12.0	8.5	7.5	1.5	1.0	1.0	1.0	.0	.0	.5	.5
4	12.0	11.0	7.5	7.0	1.0	.5	1.0	.0	.0	.0	.5	.5
5	11.5	11.0	7.0	7.0	2.5	1.0	.0	.0	.0	.0	.5	.5
6	11.0	11.0	7.0	7.0	2.5	2.5	.0	.0	.0	.0	.5	.5
7	11.0	10.5	7.0	6.5	2.5	2.5	.0	.0	.0	.0	.5	.5
8	10.5	10.0	6.5	6.0	2.5	1.5	.0	.0	.0	.0	.5	.5
9	10.0	9.5	6.0	4.5	1.5	1.0	.0	.0	.0	.0	1.0	.5
10	9.0	9.0	4.5	4.0	2.0	1.0	.0	.0	.0	.0	1.5	1.0
11	9.0	8.5	4.0	3.5	3.0	2.0	.0	.0	.0	.0	1.5	.5
12	8.5	8.5	4.0	3.5	2.5	2.0	.0	.0	.0	.0	.5	.5
13	8.5	8.0	4.0	4.0	2.0	.5	.0	.0	.0	.0	.5	.5
14	8.0	8.0	4.5	4.0	.5	.0	.0	.0	.0	.0	1.5	.5
15	9.0	8.0	4.5	4.5	.0	.0	.0	.0	.0	.0	2.5	1.0
16	9.5	9.0	4.5	4.5	.0	.0	.0	.0	.0	.0	4.0	2.5
17	10.0	9.5	5.0	4.5	.0	.0	.0	.0	.0	.0	---	---
18	10.5	10.0	5.5	5.0	.0	.0	.0	.0	.0	.0	---	---
19	11.5	10.5	7.0	5.5	.0	.0	.0	.0	.0	.0	---	---
20	13.0	11.5	7.0	7.0	.0	.0	.0	.0	.0	.0	2.0	1.5
21	14.5	13.0	7.0	7.0	.0	.0	.0	.0	1.5	.0	2.0	2.0
22	14.5	14.0	7.5	7.0	.5	.0	.0	.0	1.5	.5	2.0	1.0
23	14.5	12.5	7.5	7.5	2.5	.5	.0	.0	1.5	1.5	2.0	2.0
24	12.5	10.5	7.5	7.0	3.0	2.5	.0	.0	1.5	1.5	2.0	2.0
25	10.5	8.5	7.0	6.0	3.0	2.5	.0	.0	1.5	1.5	3.0	2.0
26	8.5	8.0	6.0	6.0	2.0	1.5	.0	.0	1.5	.5	4.0	2.5
27	8.0	7.0	6.0	6.0	1.5	1.5	.0	.0	.5	.5	4.0	4.0
28	7.5	7.0	5.5	4.0	1.5	.5	.0	.0	.5	.5	4.5	4.0
29	7.5	7.0	4.0	3.5	.5	.0	.0	.0	.5	.5	5.5	4.5
30	8.0	7.0	3.5	2.5	.0	.0	.0	.0	---	---	6.0	4.5
31	10.0	8.0	---	---	.0	.0	.0	.0	---	---	6.0	5.0
MONTH	14.5	7.0	10.0	2.5	3.0	.0	1.0	.0	1.5	.0		

04122500 PERE MARQUETTE RIVER AT SCOTTVILLE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	6.5	5.0					---	---	20.5	18.5	18.5	18.0
2	8.0	5.5					---	---	20.5	19.0	18.5	18.0
3	8.0	6.0					---	---	19.5	18.5	18.5	17.5
4	6.0	5.0					---	---	20.0	18.5	18.5	18.0
5	7.5	5.0					---	---	21.0	19.5	18.5	17.0
6	7.5	6.0					---	---	21.0	20.0	18.0	17.0
7	7.0	7.0					---	---	20.0	19.5	17.5	16.5
8	8.0	7.0					---	---	21.5	20.0	18.0	17.0
9	8.0	7.5					---	---	21.5	20.5	18.0	17.5
10	7.5	6.0					---	---	21.0	20.0	17.5	16.0
11	6.0	5.5					---	---	20.0	19.0	16.0	15.0
12	6.0	5.0					---	---	19.0	18.0	15.5	15.0
13	5.5	4.5					---	---	19.0	17.5	16.5	15.0
14	5.5	4.0					---	---	18.0	17.0	16.5	16.5
15	4.0	4.0					---	---	18.0	17.5	16.5	15.5
16	5.5	3.0					---	---	18.0	17.0	15.5	15.5
17	5.5	4.0					---	---	17.0	17.0	15.5	14.5
18	8.5	5.0					---	---	17.5	16.5	14.5	13.5
19	10.5	8.0					---	---	17.5	17.0	13.5	13.5
20	12.0	9.5					---	---	19.0	17.0	14.5	13.5
21	12.5	10.5					---	---	19.0	19.0	15.0	14.5
22	15.0	11.5					---	---	19.0	18.5	15.0	15.0
23	15.0	12.0					20.5	19.0	19.0	18.0	15.0	14.5
24	13.5	9.5					20.5	19.0	18.5	18.0	14.5	13.0
25	---	---					20.5	19.0	18.5	18.0	13.0	13.0
26	---	---					19.5	18.5	18.5	17.5	13.0	12.0
27	---	---					18.5	18.0	18.5	18.0	12.0	11.0
28	---	---					20.0	18.0	19.0	18.0	11.5	11.0
29	---	---					21.0	19.0	20.0	19.0	12.5	11.5
30	---	---					21.0	19.0	20.0	19.5	13.0	12.0
31	---	---					19.0	18.5	19.5	18.5	---	---
MONTH									21.5	16.5	18.5	11.0

04124000 MANISTEE RIVER NEAR SHERMAN, MI

LOCATION.--Lat 44°26'11", long 85°41'55", in NE¼ NE¼ sec.36, T.24 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on downstream side of bridge near right pier on State Highway 37, 250 ft (76 m) upstream from Wheeler Creek, 0.9 mi (1.4 km) north of Sherman, and at mile 60.8 (97.8 km).

DRAINAGE AREA.--900 mi² (2,331 km²).

PERIOD OF RECORD.--July 1903 to May 1916, October 1930 to September 1931, October 1933 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1004: 1936(m). WSP 1307: 1911, 1913-14(M), 1934(M), 1936(M), 1937, 1939-40(M). WSP 1437: 1911, 1913(M), 1937.

GAGE.--Nonrecording gage. Altitude of gage is 804 ft (245 m), from river-profile map. Prior to Apr. 13, 1934, at various datums.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--60 years (water years 1904-15, 1931, 1934-80), 1,057 ft³/s (29.93 m³/s), 15.95 in/yr (405 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,570 ft³/s (101 m³/s) Mar. 25, 1913, gage height, 7.1 ft (2.16 m), from graph based on gage readings, datum then in use; minimum daily, 540 ft³/s (15.3 m³/s) Feb. 21-23, 1936.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,350 ft³/s (66.6 m³/s) Apr. 11, gage height, 14.27 ft (4.349 m); minimum, 739 ft³/s (20.9 m³/s) Aug. 29, gage height, 10.43 ft (3.179 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	799	991	1100	1050	920	900	1450	1240	1090	1390	898	865
2	799	982	1080	1050	900	910	1480	1260	1050	1240	883	889
3	799	970	1050	1040	880	910	1490	1190	1020	1070	889	874
4	811	961	1040	1030	880	900	1450	1170	970	1030	844	883
5	829	943	1040	1020	880	900	1410	1150	943	1080	823	920
6	832	946	1050	1010	880	900	1390	1140	952	1050	838	958
7	835	958	1040	1010	880	900	1450	1120	1000	937	829	931
8	835	958	1030	1020	880	900	1600	1100	1060	961	862	871
9	841	946	1020	1020	880	890	2120	1100	1000	931	973	910
10	844	940	1020	1020	880	880	2290	1090	1020	904	1060	901
11	856	937	1030	1040	880	880	2330	1090	1050	913	1140	925
12	874	943	1020	1080	880	880	2100	1090	997	904	1170	931
13	901	952	1030	1110	880	890	1980	1080	949	892	994	901
14	934	952	1030	1170	870	910	1850	1080	943	874	862	889
15	931	940	1030	1250	870	931	1660	1080	940	868	838	901
16	910	940	1050	1420	870	916	1610	1080	934	880	826	934
17	901	934	1020	1540	880	934	1590	1080	925	883	820	922
18	910	940	1020	1550	880	988	1550	1100	919	883	814	898
19	916	952	1010	1350	880	1040	1510	1140	991	868	811	889
20	922	964	1000	1300	890	1150	1480	1160	1180	937	826	883
21	925	964	1000	1260	890	1260	1440	1140	1290	976	823	934
22	949	994	997	1160	890	1320	1430	1120	1220	979	832	994
23	1020	1030	1060	1070	890	1370	1420	1060	1120	949	862	985
24	1050	1040	1300	1040	890	1300	1360	997	1060	871	853	967
25	1060	1030	1440	1010	890	1010	1310	997	1060	949	835	940
26	1080	1200	1390	1000	890	1050	1300	985	1090	1220	793	922
27	1080	1460	1330	990	890	1090	1300	970	1220	988	778	898
28	1080	1430	1260	980	900	1110	1290	943	1310	973	784	868
29	1080	1260	1180	970	900	1180	1300	931	1390	1070	751	865
30	1030	1040	1100	950	---	1310	1290	1150	1400	1090	772	874
31	1000	---	1070	940	---	1400	---	1250	---	967	811	---
TOTAL	28633	30577	33837	34450	25670	31909	47230	34083	32093	30527	26894	27330
MEAN	924	1019	1092	1111	885	1029	1574	1099	1070	985	868	911
MAX	1080	1460	1440	1550	920	1400	2330	1260	1400	1390	1170	994
MIN	799	934	997	940	870	880	1290	931	919	868	751	865
CFSM	1.03	1.13	1.21	1.23	.98	1.14	1.75	1.22	1.19	1.09	.96	1.01
IN.	1.18	1.26	1.40	1.42	1.06	1.32	1.95	1.41	1.33	1.26	1.11	1.13

CAL YR 1979 TOTAL 403654 MEAN 1106 MAX 2310 MIN 781 CFSM 1.23 IN 16.68
WTR YR 1980 TOTAL 383233 MEAN 1047 MAX 2330 MIN 751 CFSM 1.16 IN 15.84

04125500 PINE RIVER NEAR HOXEYVILLE, MI

LOCATION.--Lat 44°12'11", long 85°47'58", in SW¼ NW¼ sec.20, T.21 N., R.12 W., Wexford County, Hydrologic Unit 04060103, on right bank 500 ft (152 m) upstream from bridge on State Highway 37, 4.2 mi (6.8 km) northwest of Hoxeyville, 8.0 mi (12.9 km) east of Wellston, and 8.0 mi (12.9 km) upstream from mouth.

DRAINAGE AREA.--251 mi² (650 km²).

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 775 ft (236 m), by barometer.

REMARKS.--Records fair except those for periods of no gage-height record, June 11 to July 22, or doubtful gage-height record, Oct. 1-19, Nov. 3 to June 10, which are poor. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 288 ft³/s (8.156 m³/s), 15.58 in/yr (396 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,440 ft³/s (69.1 m³/s) Aug. 6, 1956, gage height, 6.82 ft (2.079 m), from rating curve extended above 1,100 ft³/s (31.2 m³/s); minimum, 161 ft³/s (4.56 m³/s) Feb. 2, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 630 ft³/s (17.8 m³/s) Apr. 10, gage height, 3.01 ft (0.917 m), no peak above base of 650 ft³/s (18.4 m³/s); minimum, 218 ft³/s (6.17 m³/s) Aug. 24-28; minimum gage height, 1.87 ft (0.570 m) Sept. 7-9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	240	266	300	298	260	250	410	380	480	270	233	252
2	240	272	295	290	255	250	400	370	430	250	231	264
3	241	270	290	290	250	250	390	360	370	240	228	249
4	245	258	288	290	250	250	400	350	310	240	230	235
5	260	248	285	290	250	250	395	344	290	240	226	229
6	256	245	285	288	248	250	390	338	350	240	223	225
7	253	242	285	290	248	250	400	332	330	242	222	223
8	250	245	283	290	248	251	460	326	450	246	229	222
9	250	248	282	292	250	252	560	322	400	248	231	238
10	250	250	282	292	250	254	600	320	360	250	226	254
11	249	249	285	293	251	254	570	320	330	248	235	242
12	247	246	290	295	253	254	560	320	300	245	247	247
13	260	245	295	298	255	254	530	340	275	242	258	285
14	258	242	298	300	255	255	500	355	260	240	240	315
15	255	240	300	302	256	255	470	380	250	240	234	281
16	252	240	300	305	256	260	460	360	248	240	227	282
17	250	240	298	315	255	270	450	340	248	242	223	396
18	250	240	295	350	253	290	435	370	248	245	222	444
19	250	240	290	335	252	325	420	350	275	248	222	355
20	270	240	288	320	250	350	405	325	300	270	253	320
21	277	246	284	310	250	370	390	315	290	280	259	323
22	280	270	282	300	250	390	380	300	280	270	238	338
23	331	290	300	290	250	400	370	282	265	251	227	375
24	381	290	330	285	250	380	360	270	255	242	223	338
25	331	280	370	280	250	310	350	260	250	237	218	309
26	294	350	350	278	250	290	355	256	250	235	218	311
27	279	390	330	278	250	315	365	252	250	242	218	298
28	274	370	315	275	250	330	370	250	280	248	221	281
29	272	325	305	270	250	350	380	250	300	242	230	272
30	266	310	300	268	---	380	395	350	290	235	250	265
31	261	---	300	265	---	400	---	420	---	235	231	---
TOTAL	8272	8087	9280	9122	7295	9189	12920	10107	9214	7643	7173	8668
MEAN	267	270	299	294	252	296	431	326	307	247	231	289
MAX	381	390	370	350	260	400	600	420	480	280	259	444
MIN	240	240	282	265	248	250	350	250	248	235	218	222
CFSM	1.06	1.08	1.19	1.17	1.00	1.18	1.72	1.30	1.22	.98	.92	1.15
IN.	1.23	1.20	1.38	1.35	1.08	1.36	1.91	1.50	1.37	1.13	1.06	1.28

CAL YR 1979 TOTAL 120768 MEAN 331 MAX 1400 MIN 222 CFSM 1.32 IN 17.90
WTR YR 1980 TOTAL 106970 MEAN 292 MAX 600 MIN 218 CFSM 1.16 IN 15.85

04126000 MANISTEE RIVER NEAR MANISTEE, MI

LOCATION.--Lat 44°16'14", long 86°11'56", in NW¼ NW¼ sec.36, T.22 N., R.16 W., Manistee County, Hydrologic Unit 04060103, on right bank 6.4 mi (10.3 km) northeast of Manistee, 7.8 mi (12.6 km) upstream from Manistee Lake, and at mile 10.8 (17.4 km).

DRAINAGE AREA.--1,780 mi² (4,610 km²), approximately.

PERIOD OF RECORD.--October 1951 to current year. Monthly discharge only for October, November, 1951, published in WSP 1727.

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m), from river-profile map.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated at all stages by Tippy hydroelectric powerplant 21 mi (34 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 2,001 ft³/s (56.67 m³/s), 15.27 in/yr (388 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,120 ft³/s (202 m³/s) Mar. 30, 1976, gage height, 8.37 ft (2.551 m); maximum gage height, 9.15 ft (2.789 m) Feb. 12, 1955, backwater from ice; minimum daily discharge, 570 ft³/s (16.1 m³/s) June 18, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,700 ft³/s (133 m³/s) Apr. 13, gage height, 7.73 ft (2.356 m); minimum, 536 ft³/s (15.2 m³/s) June 18, gage height, 3.13 ft (0.954 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1130	2070	2790	2090	2220	1870	2640	3360	2030	2480	2250	1690
2	1960	2420	2040	2410	1980	1560	2930	3310	2120	2470	1400	2120
3	1580	2030	1510	2170	1800	1650	3120	3110	1770	2460	875	1900
4	1480	1610	2620	2090	1600	1760	3070	2480	2250	1950	1740	1640
5	2090	1690	2190	2130	1600	1810	2810	2000	2230	1310	1790	1450
6	1930	2150	2340	1550	1750	2030	2350	2660	2330	2100	1840	1400
7	1390	2130	2420	1670	1950	2460	2300	2450	2610	1760	1750	1230
8	1270	2190	2210	2320	2260	1930	2800	2310	2460	1790	1810	1920
9	1900	1970	2180	2000	2200	1770	3560	2600	2580	1930	1950	1700
10	1770	2030	2220	1750	1640	1770	4220	2630	2510	1650	1390	1800
11	2160	1810	2360	1800	1670	2210	4500	2650	2250	1800	1330	1630
12	2080	1790	2350	1950	1980	2660	4260	2250	2360	1930	1590	1920
13	2370	1960	2440	2000	2140	2160	4620	2190	2120	1960	2070	1930
14	1670	2140	2340	2200	2140	1990	4010	2740	1370	1840	1970	1760
15	1420	2020	2250	2470	2180	1950	3440	3100	1360	1990	1770	1260
16	2190	2010	2070	2470	1990	176[illegible]	3420	3130	1230	1850	1680	1890
17	2240	2060	1930	2690	1890	170[illegible]	3170	2530	643	2010	1330	2320
18	1350	1760	1990	3310	1690	2530	3060	1860	570	1500	1210	1970
19	2170	1550	1840	3790	2100	2320	3060	2110	1110	1070	1650	2320
20	2220	2130	1880	3110	2040	2410	2910	2190	1360	1250	1920	2330
21	1740	2050	1920	2440	2190	2800	2500	2530	1480	1610	2520	1900
22	1730	2150	2220	2770	2090	3020	2830	2440	1820	1760	1910	1780
23	2300	2590	2200	2580	2150	3190	3130	2220	2120	1710	1500	2250
24	2230	2230	2540	2290	1780	3180	3440	2070	1970	1770	1280	2050
25	2530	1960	2630	1940	1640	2770	3230	1870	1980	1820	1170	2190
26	2480	2200	3420	1860	2010	2440	2950	1740	1930	1630	1480	2380
27	2700	2850	3200	1560	2000	2410	2300	1800	1580	1340	1930	2160
28	1930	3140	3170	2090	1970	2540	2070	1740	1820	1630	1750	1640
29	1640	3310	2900	2250	2030	2420	2930	1760	2440	1790	1560	1420
30	2800	3130	2300	1950	---	2040	3250	1880	2370	2390	1710	1900
31	2010	---	2060	2200	---	1970	---	2240	---	2460	1350	---
TOTAL	60460	65130	72580	69900	56680	69100	94880	73950	56773	57010	51475	55850
MEAN	1950	2171	2341	2255	1954	2229	3163	2385	1892	1839	1660	1862
MAX	2800	3310	3420	3790	2260	3190	4620	3360	2610	2480	2520	2380
MIN	1130	1550	1510	1550	1600	1560	2070	1740	570	1070	875	1230
CFSM	1.10	1.22	1.32	1.27	1.10	1.25	1.78	1.34	1.06	1.03	.93	1.05
IN.	1.26	1.36	1.52	1.46	1.18	1.44	1.98	1.55	1.19	1.19	1.08	1.17

CAL YR 1979 TOTAL 796420 MEAN 2182 MAX 4710 MIN 780 CFSM 1.23 IN 16.64
WTR YR 1980 TOTAL 783788 MEAN 2141 MAX 4620 MIN 570 CFSM 1.20 IN 16.38

04126520 MANISTEE RIVER AT MANISTEE, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 44°15'02", long 86°19'09", in SW¼ SW¼ sec.1, T.21 N., R.17 W., Manistee County, Hydrologic Unit 04060103, at upstream side of bridge on U.S. Highway 31, in Manistee, and 1.3 mi (2.1 km) upstream from mouth.

DRAINAGE AREA.--2,000 mi² (5,180 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since March 1977.

REMARKS.--In addition to water-quality monitor, samples were collected by a local observer on an approximate twice-weekly basis. Water-discharge measurements are made at times of monthly sampling. Interruptions in the record were due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,680 micromhos Nov. 18, 1974; minimum daily, 226 micromhos Apr. 22, 1980.
WATER TEMPERATURES: Maximum, 25.0°C July 20, 21, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum recorded, 962 micromhos Nov. 23; minimum, 226 micromhos Apr. 22.
WATER TEMPERATURES: Maximum, 23.5°C July 14, Aug. 30; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)
OCT											
11...	1045	2760	487	7.9	9.5	9.6	86	12	540	55	190
NOV											
16...	0830	2710	430	7.8	3.5	11.7	89	36	760	K32	190
DEC											
12...	1430	3560	440	7.7	3.0	12.2	85	8	380	113	190
JAN											
17...	0930	2980	385	7.6	2.0	12.5	92	16	55	20	180
FEB											
15...	1300	3230	365	7.6	.0	12.3	85	25	136	K20	170
MAR											
20...	1030	3290	379	7.7	4.0	11.7	91	0	--	K36	180
APR											
22...	1330	2260	305	7.7	12.5	10.0	96	19	K7	K8	140
MAY											
13...	1400	3210	409	7.7	11.0	10.0	93	16	210	34	180
JUN											
10...	1400	3280	378	8.2	16.0	8.1	84	--	490	K14	170
JUL											
23...	1030	3100	415	7.8	22.0	7.4	86	--	540	280	180
AUG											
28...	1200	1950	451	7.8	21.0	7.4	82	--	290	K83	--
SEP											
26...	1030	3240	404	8.2	13.5	9.4	90	27	160	80	180

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)
OCT											
11...	33	56	12	0	16	20	.5	1.3	190	0	150
NOV											
16...	31	55	12	0	11	15	.4	1.2	190	0	160
DEC											
12...	51	56	12	--	13	17	.4	1.4	170	0	140
JAN											
17...	37	51	12	0	9.1	10	.3	1.1	170	0	140
FEB											
15...	27	50	12	0	11	12	.4	1.1	180	0	150
MAR											
20...	32	52	12	--	10	11	.3	1.1	180	0	150
APR											
22...	20	40	9.7	0	5.8	8	.2	1.0	160	0	120
MAY											
13...	53	55	11	0	10	11	.3	1.3	160	0	130
JUN											
10...	34	50	12	--	12	13	.4	1.2	180	0	150
JUL											
23...	27	51	12	--	11	12	.4	1.1	180	0	150
AUG											
28...	--	--	--	--	--	--	--	--	180	0	150
SEP											
26...	39	52	12	0	13	14	.4	1.2	180	0	140

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT 11...	3.8	13	50	.1	7.6	257	251	1920	10	288
NOV 16...	4.8	14	37	.1	8.3	229	233	1680	0	252
DEC 12...	5.4	13	42	.1	8.4	262	231	2520	6	278
JAN 17...	6.8	12	26	.1	8.2	208	204	1670	5	235
FEB 15...	7.2	14	33	.1	8.0	219	219	1910	5	248
MAR 20...	5.7	13	34	.1	8.1	231	--	2050	7	251
APR 22...	4.7	12	9.6	.1	6.3	176	165	1070	11	214
MAY 13...	5.1	12	43	.1	6.9	261	218	2260	0	315
JUN 10...	1.7	12	31	.1	7.5	255	211	2260	--	--
JUL 23...	4.5	11	34	.1	5.8	271	217	2270	10	281
AUG 28...	4.6	12	51	.1	--	277	--	1460	9	295
SEP 26...	1.7	12	34	.1	8.3	248	222	2170	11	284

DATE	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)
OCT 11...	.11	.11	.080	.250	.10	.13	.21	.32	1.4	.020
NOV 16...	--	.25	.050	.050	.06	.16	.21	--	--	.010
DEC 12...	.30	.30	.060	.060	.07	.20	.26	.56	2.5	.020
JAN 17...	.25	.23	.010	.020	.01	.11	.12	.37	1.6	.020
FEB 15...	.23	.24	.050	.040	.06	.26	.31	.54	2.4	.020
MAR 20...	.35	.35	.050	.000	.06	.12	.17	.52	2.3	.020
APR 22...	.31	.30	.060	.010	.07	.30	.36	.67	3.0	.030
MAY 13...	.17	.17	.080	.050	.10	.39	.47	.64	2.8	.030
JUN 10...	.17	.16	.060	.030	.07	.25	.31	.48	2.1	.040
JUL 23...	.12	.12	.050	.070	.06	.22	.27	.39	1.7	.020
AUG 28...	.07	.07	.060	.000	.07	.29	.35	.42	1.9	.020
SEP 26...	.15	.16	.000	.020	.00	.28	.28	.43	1.9	.030

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	PHOSPHORUS, ORTHOPHOSPHATE DISSOL. (MG/L AS P)	PHOSPHORUS, ORTHOPHOSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTOPLANKTON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTOPLANKTON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 11...	.06	.010	.020	.06	--	--	--	5	37	100
NOV 16...	.03	.010	.000	.00	10.3	.000	--	--	--	--
DEC 12...	.06	.010	.010	.03	.670	.000	11	5	48	100
JAN 17...	.06	.020	.000	.00	.000	.000	--	--	--	--
FEB 15...	.06	.010	.000	.00	.000	.000	3.5	--	--	--
MAR 20...	.06	.010	.010	.03	.000	.000	5.3	11	98	100
APR 22...	.09	.010	.000	.00	1.41	.000	--	--	--	--
MAY 13...	.09	.010	.000	.00	3.28	.000	5.5	--	--	--
JUN 10...	.12	.010	--	--	2.60	.160	2.9	10	89	100
JUL 23...	.06	.010	.000	.00	5.70	.000	5.5	10	84	100
AUG 28...	.06	.000	.000	.00	2.90	.200	--	10	53	100
SEP 26...	.09	.010	.000	.00	6.35	.100	--	7	61	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)
OCT 11...	1045	3	3	--	40	--	3	--	10	--	1	8
JAN 17...	0930	1	0	100	30	--	2	20	10	0	0	4
APR 22...	1330	2	2	<50	30	--	5	30	20	--	1	--
SEP 26...	1030	1	1	100	100	0	0	--	40	0	0	43

DATE	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	LITHIUM TOTAL RECOVERABLE (UG/L AS LI)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)
OCT 11...	3	280	30	9	4	--	--	2	--	.2	7
JAN 17...	1	280	40	0	0	--	20	8	.1	<.1	2
APR 22...	5	390	40	0	0	--	20	8	.1	.1	2
SEP 26...	8	280	50	9	0	10	20	0	.2	.1	--

DATE	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	TITANIUM, DISSOLVED (UG/L AS TI)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT 11...	0	0	0	0	--	--	10	2.5	.3	--	--
JAN 17...	0	0	0	0	--	--	50	3.2	.2	--	--
APR 22...	0	0	0	0	--	10	10	10	--	--	--
SEP 26...	0	0	0	0	<5	--	70	7.9	.7	.00	2

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	PCB, TOTAL IN BOTTOM MATERIAL (UG/KG)	ALDRIN, TOTAL (UG/L)	ALDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	CHLORDANE, TOTAL (UG/L)	CHLORDANE, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDD, TOTAL (UG/L)	DDD, TOTAL IN BOTTOM MATERIAL (UG/KG)	DDE, TOTAL (UG/L)	DDE, TOTAL IN BOTTOM MATERIAL (UG/KG)
DEC 12...	1430	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	DDT, TOTAL (UG/L)	DDT, TOTAL IN BOTTOM MATERIAL (UG/KG)	DI-AZINON, TOTAL (UG/L)	DI-AZINON, TOTAL IN BOTTOM MATERIAL (UG/KG)	DI-ELDRIN TOTAL (UG/L)	DI-ELDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ENDRIN, TOTAL (UG/L)	ENDRIN, TOTAL IN BOTTOM MATERIAL (UG/KG)	ETHION, TOTAL (UG/L)	ETHION, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTA-CHLOR, TOTAL (UG/L)
DEC 12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA-CHLOR, TOTAL IN BOTTOM MATERIAL (UG/KG)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOT. IN BOTTOM MATL. (UG/KG)	LINDANE TOTAL (UG/L)	LINDANE TOTAL IN BOTTOM MATERIAL (UG/KG)	MALA-THION, TOTAL (UG/L)	MALA-THION, TOTAL IN BOTTOM MATERIAL (UG/KG)	METH-OXY-CHLOR, TOTAL (UG/L)	METH-OXY-CHLOR, TOT. IN BOTTOM MATL. (UG/KG)	METHYL PARA-THION, TOTAL (UG/L)	METHYL PARA-THION, TOT. IN BOTTOM MATL. (UG/KG)
DEC 12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	METHYL TRI-THION, TOTAL (UG/L)	METHYL TRI-THION, TOT. IN BOTTOM MATL. (UG/KG)	PARA-THION, TOTAL (UG/L)	PARA-THION, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOX-APHENE, TOTAL (UG/L)	TOXA-PHENE, TOTAL IN BOTTOM MATERIAL (UG/KG)	TOTAL TRI-THION (UG/L)	TRI-THION, TOTAL IN BOTTOM MATERIAL (UG/KG)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
DEC 12...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
DEC 12...	1430	33	.00	.710	.710	.420	.000
FEB 15...	1300	29	229	.080	.160	.350	.000
MAY 13...	1400	21	972	4.65	5.35	.720	.200
AUG 28...	1200	36	--	--	--	1.30	.000

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 15,78	MAR 21,79	MAY 9,79	JUN 13,79	JUL 18,79
TIME	1000	0915	1000	0900	1030
TOTAL CELLS/ML	1500	71	1000	490	1200
DIVERSITY: DIVISION	1.1	0.6	0.3	1.6	1.3
.CLASS	1.1	0.6	0.3	1.6	1.3
..ORDER	1.8	1.4	0.8	1.8	1.7
...FAMILY	1.9	2.4	0.9	2.4	2.5
....GENUS	1.9	2.4	1.0	2.4	2.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	230#	47	100	8
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	210#	16
...OOCYSTACEAE										
....ANKISTRODESMUS	14	1	--	-	14	1	39	8	39	3
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	14	1	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	51	4
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	72	5	--	-	--	-	--	-	130	10
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..ULOTRICHALES										
...ULOTRICHACEAE										
....ULOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CARTERIA	14	1	--	-	14	1	--	-	--	-
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	13	1
...VOLVOCACEAE										
....EUDORINA	--	-	--	-	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	810#	53	25#	36	830#	83	26	5	13	1
....MELOSIRA	--	-	--	-	--	-	--	-	530#	42
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	15#	21	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	350#	23	--	-	--	-	--	-	--	-
....FRAGILARIA	14	1	--	-	--	-	26	5	--	-
....SYNEDRA	--	-	5	7	29	3	--	-	51	4
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	10	14	--	-	13	3	--	-
...NAVICULACEAE										
....NAVICULA	--	-	5	7	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	100	10	--	-	26	2
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	13	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 15,78 1000		MAR 21,79 0915		MAY 9,79 1000		JUN 13,79 0900		JUL 18,79 1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	64	13	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	14	1	--	-	--	-	51	11	77	6
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	230#	15	--	-	--	-	39	8	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
....ANABAENOPSIS	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	14	1	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	10	14	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 15,79	SEP 18,79	NOV 16,79	MAR 20,80
TIME	0900	1330	0830	1030
TOTAL CELLS/ML	740	5700	460	51
DIVERSITY: DIVISION	1.4	1.5	1.4	0.0
.CLASS	1.4	1.5	1.4	0.0
..ORDER	2.1	2.4	0.0	0.8
...FAMILY	2.3	3.0	0.0	2.0
....GENUS	2.3	3.2	0.0	2.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	13	2	*	0	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	720	13	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	100	2	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	26	4	*	0	25	5	--	-
....CHLORELLA	--	-	--	-	5	1	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	39	1	--	-	--	-
....TREUBARIA	--	-	*	0	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	52	1	--	-	--	-
....SCENEDESMUS	100	14	150	3	--	-	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	52	1	--	-	--	-
..ULOTRICHALES								
...ULOTRICHACEAE								
....ULOTHRIX	--	-	230	4	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	*	0	10	2	--	-
...VOLVOCACEAE								
....EUDORINA	310#	42	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	--	-	--	-	5	1	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	26	4	360	6	56	12	13#	25
....MELOSIRA	--	-	210	4	36	8	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	5	1	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	10	2	13#	25
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	10	2	--	-
....FRAGILARIA	77	11	100	2	20	4	--	-
....SYNEDRA	--	-	--	-	5	1	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	46	10	13#	25
...NITZSCHIACEAE								
....NITZSCHIA	--	-	*	0	--	-	13#	25
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	--	-	--	-	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 15,79 0900		SEP 18,79 1330		NOV 16,79 0830		MAR 20,80 1030	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES	--	-	--	-	30	7	--	-
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	100	2	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	90	2	200#	43	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	1900#	33	--	-	--	-
....ANACYSTIS	170#	23	*	0	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	52	1	--	-	--	-
....ANABAENOPSIS	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	770	14	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	620	11	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	13	2	*	0	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAY 13,80	JUN 10,80	AUG 28,80	SEP 26,80
TIME	1400	1400	1200	1030
TOTAL CELLS/ML	490	570	2000	1300
DIVERSITY: DIVISION	1.0	1.6	1.5	1.3
.CLASS	1.0	1.7	1.5	1.3
..ORDER	1.5	2.3	2.0	1.8
...FAMILY	1.7	2.5	2.2	2.3
....GENUS	2.3	2.7	2.4	2.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	410#	33
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	310#	16	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	13	2	--	-	26	2
....CHLORELLA	--	-	26	5	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-
....OOCYSTIS	13	3	--	-	--	-	--	-
....SELENASTRUM	--	-	39	7	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	52	11	--	-	--	-	100	8
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
..ULOTRICHALES								
...ULOTRICHACEAE								
....ULOTHRIX	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CARTERIA	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	26	5	26	5	--	-	26	2
...VOLVOCACEAE								
....EUDORINA	--	-	--	-	--	-	--	-
....PANDORINA	--	-	210#	36	--	-	210#	16
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	250#	51	52	9	13	1	140	11
....MELOSIRA	91#	19	--	-	230	12	260#	20
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	720#	37	--	-
....SYNEDRA	26	5	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	13	1	--	-
...NAVICULACEAE								
....NAVICULA	13	3	--	-	13	1	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	52	9	26	1	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	--	-	13	2	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980

IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAY 13,80 1400		JUN 10,80 1400		AUG 28,80 1200		SEP 26,80 1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	13	3	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	13	3	--	-	--	-	52	4
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	120#	20	13	1	39	3
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	460#	24	--	-
....ANABAENOPSIS	--	-	--	-	140	7	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	26	1	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	26	5	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
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04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	648	351	405	459	330	366	385	325	347
2	---	---	---	445	343	388	461	322	357	426	329	358
3	---	---	---	488	349	385	538	355	397	477	324	359
4	---	---	---	770	329	379	547	357	399	484	326	363
5	414	359	385	803	333	397	578	334	397	395	337	358
6	451	378	405	542	339	386	448	357	395	744	342	448
7	400	379	390	417	332	371	423	336	375	692	351	431
8	485	389	418	464	348	401	583	383	412	765	340	449
9	469	387	415	441	346	379	480	324	399	652	362	450
10	406	386	396	406	343	363	646	318	372	798	379	515
11	523	380	406	654	375	430	616	327	366	520	337	398
12	440	382	403	612	358	424	545	349	381	720	350	410
13	466	373	422	744	370	437	502	328	381	590	342	409
14	415	374	388	672	366	422	461	365	404	436	340	376
15	410	374	387	684	362	453	674	325	404	465	337	380
16	427	357	382	551	358	400	---	---	---	473	350	387
17	427	342	370	481	343	391	---	---	---	400	326	362
18	465	366	385	422	335	357	894	348	437	415	338	358
19	450	349	381	530	333	388	740	338	426	405	330	370
20	424	330	360	581	364	424	502	321	374	462	330	377
21	379	339	353	878	336	448	491	321	364	420	330	365
22	768	346	427	852	350	457	482	340	373	411	329	368
23	665	349	416	962	343	443	632	336	382	428	336	380
24	626	384	428	488	323	380	411	318	362	455	328	381
25	458	355	388	545	351	394	514	333	390	435	326	373
26	444	346	372	922	331	433	502	341	386	440	345	376
27	453	362	388	535	358	401	429	337	377	448	333	388
28	455	352	390	475	337	385	487	355	392	550	347	407
29	405	354	376	450	342	384	449	344	386	420	323	367
30	510	342	375	461	362	389	396	327	353	444	330	369
31	718	330	367	---	---	---	381	331	348	387	321	347
MONTH				962	323	403				798	321	388

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	370	321	344	---	---	---	380	279	331	353	250	292
2	378	315	339	---	---	---	404	292	337	347	262	301
3	383	338	356	436	383	413	436	289	336	347	269	298
4	396	321	365	421	371	392	491	241	344	381	273	317
5	392	324	358	429	364	398	397	302	339	592	273	332
6	382	332	351	---	---	---	384	248	283	650	296	376
7	369	324	348	---	---	---	521	258	304	624	270	324
8	382	327	353	---	---	---	431	241	319	507	280	329
9	383	323	346	---	---	---	356	228	296	480	288	330
10	393	334	354	---	---	---	382	255	308	420	286	328
11	384	339	353	---	---	---	404	269	319	603	299	372
12	382	327	350	---	---	---	433	246	322	677	310	400
13	399	341	364	---	---	---	453	260	323	714	306	385
14	427	341	381	---	---	---	366	235	296	612	306	363
15	429	353	386	---	---	---	413	254	297	473	305	355
16	423	344	372	---	---	---	376	250	288	379	298	340
17	---	---	---	---	---	---	389	252	292	487	307	357
18	---	---	---	---	---	---	396	237	278	571	309	359
19	425	357	386	---	---	---	424	254	299	648	326	374
20	413	349	375	---	---	---	388	250	298	525	321	393
21	525	357	418	353	297	322	361	240	292	503	320	367
22	490	361	418	360	314	333	328	226	266	439	338	378
23	443	348	388	348	280	317	413	241	298	459	339	372
24	425	372	401	330	287	313	389	254	302	528	357	406
25	462	390	419	333	297	318	352	243	306	499	353	405
26	461	386	417	321	278	299	405	249	289	535	363	393
27	471	395	428	339	274	302	351	245	284	554	352	417
28	422	381	398	322	254	295	316	237	268	490	342	398
29	---	---	---	366	254	287	324	237	270	583	350	433
30	---	---	---	344	273	321	385	254	289	706	353	452
31	---	---	---	365	277	313	---	---	---	485	378	413
MONTH							521	226	302	714	250	366

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	464	369	407	451	410	428	428	399	407	578	350	408
2	442	375	417	431	387	408	454	378	406	554	353	388
3	515	394	438	462	411	434	484	427	462	540	342	386
4	452	386	416	431	390	407	480	429	446	---	---	---
5	504	416	440	567	394	523	491	428	446	---	---	---
6	583	385	468	536	462	491	437	420	428	---	---	---
7	661	356	435	543	438	496	490	418	451	---	---	---
8	443	370	402	545	376	449	502	432	467	---	---	---
9	470	341	382	611	424	490	487	409	435	---	---	---
10	386	347	365	543	371	415	530	408	454	---	---	---
11	418	344	375	617	411	499	502	393	450	---	---	---
12	401	384	394	490	437	467	431	390	410	---	---	---
13	416	383	396	477	385	429	422	375	394	---	---	---
14	673	412	519	425	368	395	418	397	407	---	---	---
15	695	621	650	422	373	391	404	371	386	---	---	---
16	639	549	589	490	396	439	410	374	389	---	---	---
17	661	549	589	480	346	422	479	383	412	---	---	---
18	675	567	633	404	357	374	661	392	435	---	---	---
19	727	646	682	444	371	405	482	371	413	---	---	---
20	702	599	637	526	347	460	518	379	430	---	---	---
21	635	520	569	500	391	431	484	359	409	---	---	---
22	549	500	528	406	354	373	483	352	394	---	---	---
23	503	420	461	394	357	367	498	369	409	---	---	---
24	634	414	520	406	376	388	670	371	432	---	---	---
25	611	495	560	414	396	403	514	388	434	---	---	---
26	634	482	539	413	396	402	490	399	430	---	---	---
27	802	615	714	426	399	410	518	379	411	---	---	---
28	797	611	676	430	401	412	489	370	409	---	---	---
29	661	569	607	438	415	423	490	346	403	---	---	---
30	546	467	492	426	409	417	517	367	398	---	---	---
31	---	---	---	447	420	427	475	366	403	---	---	---
MONTH	802	341	510	617	354	428	670	346	421			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	---	---	---	10.0	9.0	9.5	2.5	1.0	2.0	2.0	1.5	2.0
2	---	---	---	9.5	7.5	8.5	2.0	1.5	1.5	2.0	2.0	2.0
3	---	---	---	8.0	7.5	7.5	2.5	1.0	1.5	2.0	1.5	1.5
4	---	---	---	7.5	7.0	7.0	2.5	1.5	1.5	1.5	1.0	1.5
5	14.5	13.5	[illegible]	7.5	7.0	7.5	3.0	1.5	2.0	1.5	1.0	1.0
6	14.5	13.5	[illegible]	8.0	7.5	7.5	3.5	3.0	3.0	1.5	1.0	1.0
7	13.5	12.5	[illegible]	7.5	6.5	7.0	3.0	1.5	2.5	1.5	.5	1.0
8	12.5	11.5	12.0	7.0	5.5	6.5	2.0	1.0	1.5	1.5	.5	1.0
9	12.5	11.5	12.0	6.0	5.0	5.5	2.0	1.0	1.5	1.5	.5	1.0
10	11.0	10.5	11.0	5.5	5.0	5.0	2.5	1.5	1.5	1.5	.5	1.0
11	10.5	10.0	10.5	5.0	4.5	5.0	3.5	2.5	3.0	1.0	.5	1.0
12	10.5	9.5	10.0	5.5	4.5	5.0	4.5	1.5	2.5	1.0	.5	1.0
13	10.0	8.5	9.5	5.5	5.0	5.5	2.0	1.0	1.5	1.0	.5	1.0
14	9.0	8.5	8.5	6.0	5.0	5.5	1.0	.5	1.0	1.0	.0	.5
15	9.5	8.5	8.5	5.5	5.5	5.5	1.5	.5	1.0	.5	.0	.5
16	10.0	9.0	9.5	5.5	5.0	5.0	1.5	.5	1.0	---	---	---
17	10.5	10.0	10.5	5.5	5.0	5.0	---	---	---	---	---	---
18	10.5	10.0	10.0	5.5	5.0	5.0	.5	.0	.0	1.5	1.5	1.5
19	11.0	10.0	10.5	6.0	5.5	6.0	1.0	.0	.5	1.5	1.0	1.5
20	12.0	10.5	11.5	6.5	6.0	6.5	1.0	.5	.5	1.0	1.0	1.0
21	14.0	12.5	13.0	6.0	5.5	6.0	1.0	.5	.5	1.5	1.0	1.0
22	14.5	13.0	14.0	6.0	6.0	6.0	1.5	1.0	1.0	1.5	1.0	1.0
23	14.0	12.0	13.0	6.0	5.5	6.0	2.0	1.0	1.5	1.0	.5	1.0
24	12.0	9.5	10.5	5.5	5.0	5.5	3.0	2.0	2.5	1.5	.5	1.0
25	10.0	8.5	9.0	5.5	5.0	5.0	2.5	2.0	2.0	1.0	.5	1.0
26	8.5	7.5	8.0	5.5	5.0	5.0	2.0	1.5	2.0	1.0	.5	1.0
27	8.5	7.5	8.0	5.5	5.0	5.0	2.0	1.5	2.0	1.0	.5	.5
28	8.5	8.0	8.0	5.0	4.0	4.5	2.0	1.5	2.0	1.0	.5	1.0
29	9.0	7.5	8.0	4.0	3.5	4.0	2.0	1.5	2.0	1.0	.0	.5
30	9.0	8.0	8.5	3.5	2.0	3.0	1.5	1.5	1.5	1.0	.0	.5
31	9.5	8.0	8.5	---	---	---	2.0	1.5	1.5	.5	.0	.0
MONTH				10.0	2.0	6.0						

04126520 MANISTEE RIVER AT MANISTEE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	1.0	.0	.5	---	---	---	5.5	5.0	5.0	11.5	10.0	11.0
2	.5	.0	.0	---	---	---	6.0	5.0	5.5	12.0	11.0	11.5
3	.5	.0	.0	1.5	.5	1.0	5.5	4.5	5.5	13.5	12.0	12.5
4	1.0	.0	.5	1.5	.5	1.0	5.5	4.5	4.5	14.5	12.5	14.0
5	1.0	.0	.5	1.5	.5	1.0	6.0	5.0	5.5	15.5	13.0	14.5
6	1.0	.0	.5	---	---	---	7.0	6.0	6.5	14.0	12.5	13.5
7	1.0	.0	.5	---	---	---	7.5	7.0	7.0	13.5	12.0	12.5
8	1.0	.0	.5	---	---	---	7.5	7.0	7.0	12.0	11.0	11.5
9	1.0	.0	.5	---	---	---	7.5	7.0	7.0	12.0	11.0	11.5
10	1.0	.0	.5	---	---	---	7.0	6.0	6.5	12.0	11.5	12.0
11	1.0	.0	.5	---	---	---	6.5	5.5	6.0	13.5	12.0	12.5
12	1.0	.0	.5	---	---	---	6.0	5.5	5.5	14.0	12.5	13.0
13	1.0	.0	.5	---	---	---	6.0	5.0	5.5	13.5	12.5	13.0
14	1.0	.5	.5	---	---	---	6.0	5.0	5.0	12.5	12.0	12.0
15	1.0	.0	.5	---	---	---	5.5	4.5	5.0	13.5	12.0	12.5
16	1.0	.0	.5	---	---	---	5.5	4.5	5.0	14.0	13.0	13.5
17	---	---	---	---	---	---	5.5	5.0	5.5	14.0	13.5	13.5
18	---	---	---	---	---	---	7.5	5.5	6.5	14.5	13.5	14.0
19	1.5	.0	1.0	---	---	---	9.0	6.5	8.0	16.0	14.0	14.5
20	1.5	.5	1.0	---	---	---	10.0	9.0	9.5	16.0	14.5	15.5
21	1.5	.5	1.0	4.0	2.0	3.5	11.0	9.5	10.0	17.0	15.5	16.0
22	1.5	1.5	1.5	3.5	2.0	2.5	12.0	10.5	11.0	17.5	16.0	16.5
23	1.5	1.5	1.5	3.0	2.5	3.0	12.0	10.0	11.0	18.0	17.0	17.5
24	1.5	1.5	1.5	2.5	2.0	2.5	10.0	9.5	9.5	19.0	17.0	18.0
25	1.5	1.0	1.5	3.0	2.0	2.5	9.5	8.5	9.0	20.0	16.5	18.5
26	1.5	1.0	1.0	4.0	3.0	3.5	10.0	9.5	9.5	19.0	17.0	18.0
27	1.0	.5	1.0	4.0	3.5	4.0	10.0	9.5	9.5	19.0	17.0	18.0
28	1.0	.5	1.0	4.0	3.5	4.0	9.5	9.5	9.5	18.5	18.0	18.5
29	---	---	---	4.5	4.0	4.0	10.0	9.5	9.5	19.0	17.5	18.5
30	---	---	---	5.0	4.0	4.5	10.5	10.0	10.0	19.5	18.0	19.0
31	---	---	---	5.5	4.5	5.0	---	---	---	19.5	18.0	18.5
MONTH							12.0	4.5	7.5	20.0	10.0	14.5

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	17.5	17.0	17.0	20.0	19.5	19.5	21.5	21.0	21.0	22.5	21.5	22.0
2	17.0	16.5	17.0	20.0	19.5	19.5	22.0	21.0	21.5	22.5	22.0	22.0
3	17.0	16.5	17.0	20.5	18.5	19.5	21.5	20.5	21.0	---	---	---
4	18.0	17.0	17.0	21.0	20.0	20.5	22.0	21.0	21.5	---	---	---
5	17.0	17.0	17.0	21.0	20.0	20.5	22.5	21.5	21.5	---	---	---
6	17.0	16.5	17.0	20.5	19.0	20.0	22.5	21.5	22.0	---	---	---
7	17.5	17.0	17.0	20.5	20.0	20.0	22.5	21.5	22.0	---	---	---
8	16.5	15.5	16.0	21.0	20.0	20.5	23.0	22.0	22.0	---	---	---
9	16.5	15.5	16.0	21.0	19.5	20.5	22.5	21.5	22.5	---	---	---
10	16.0	15.5	15.5	22.0	20.5	21.0	22.0	21.5	22.0	---	---	---
11	17.0	15.5	16.0	22.5	21.0	22.0	22.0	21.0	21.5	---	---	---
12	17.0	16.0	16.5	22.5	20.0	21.5	21.5	20.0	20.5	---	---	---
13	18.5	17.0	17.0	23.0	21.5	22.0	20.5	19.5	20.0	---	---	---
14	19.0	17.5	18.5	23.5	21.5	23.0	20.5	19.5	20.0	---	---	---
15	19.5	17.0	18.0	23.0	23.0	23.0	---	---	---	---	---	---
16	17.0	16.5	17.0	23.0	13.0	22.0	---	---	---	---	---	---
17	17.0	16.5	16.5	23.0	22.0	22.5	20.0	19.5	19.5	---	---	---
18	18.0	15.0	17.0	22.0	21.5	21.5	20.0	19.0	19.5	---	---	---
19	17.5	16.5	17.0	22.5	21.5	22.0	20.0	20.0	20.0	---	---	---
20	17.0	16.0	16.5	23.0	22.0	22.5	21.5	20.0	20.5	---	---	---
21	18.0	11.5	17.0	23.0	22.0	22.5	22.0	21.0	21.5	---	---	---
22	19.5	18.0	18.5	22.5	21.5	22.0	22.0	20.5	21.0	---	---	---
23	20.0	19.0	19.5	22.0	21.0	21.0	21.5	20.0	21.0	---	---	---
24	20.5	17.5	19.5	22.5	21.0	21.5	22.0	21.0	21.5	---	---	---
25	21.5	19.0	20.5	22.5	21.5	22.0	22.0	21.0	21.5	---	---	---
26	22.0	20.5	21.0	22.0	21.0	22.0	21.5	20.5	21.0	---	---	---
27	21.0	11.0	20.0	21.0	20.0	20.5	21.5	20.5	21.0	---	---	---
28	21.0	20.0	20.5	21.0	20.0	20.5	21.0	20.0	20.0	---	---	---
29	21.0	20.0	20.5	22.0	21.0	21.5	23.0	22.5	23.0	---	---	---
30	20.0	19.0	19.5	21.5	20.5	21.0	23.5	22.5	23.0	---	---	---
31	---	---	---	21.5	20.5	21.0	23.0	22.0	22.5	---	---	---
MONTH	22.0	11.0	18.0	23.5	13.0	21.5	23.5	19.0	21.0			

04127000 BOARDMAN RIVER NEAR MAYFIELD, MI

LOCATION.--Lat 44°38'18", long 85°31'10", in SE¼ NE¼ sec.21, T.26 N., R.10 W., Grand Traverse County, Hydrologic Unit 04060105, on right bank 25 ft (8 m) downstream from Brown's Bridge, 300 ft (91 m) downstream from East Creek, 0.9 mi (1.4 km) downstream from Brown's Bridge Dam, 1.0 mi (1.6 km) northeast of Mayfield, and 9.6 mi (15.4 km) southeast of Traverse City.

DRAINAGE AREA.--186 mi² (482 km²), revised.

PERIOD OF RECORD.--June 1952 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 760 ft (230 m), by barometer.

REMARKS.--Records good. Flow regulated by hydroelectric powerplant 0.9 mi (1.4 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 193 ft³/s (5.466 m³/s), 14.09 in/yr (358 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,220 ft³/s (34.6 m³/s) Sept. 14, 1961, gage height, 6.90 ft (2.103 m); minimum, 30 ft³/s (0.85 m³/s) Jan. 15, 1965, gage height, 2.53 ft (0.771 m); minimum daily, 47 ft³/s (1.33 m³/s) Nov. 2, 3, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 500 ft³/s (14.2 m³/s) Apr. 9, gage height, 5.00 ft (1.524 m); minimum 50 ft³/s (1.42 m³/s) Feb. 28, gage height, 2.71 ft (0.826 m); minimum daily, 126 ft³/s (3.57 m³/s) June 25, Sept. 6, 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	142	196	274	200	168	170	226	224	168	259	154	202
2	139	203	275	198	160	167	250	226	167	213	154	206
3	137	200	230	196	160	160	263	228	173	185	142	206
4	141	198	204	177	168	154	258	227	178	172	151	180
5	141	188	215	172	169	155	251	217	179	170	150	148
6	140	171	217	167	172	153	245	203	197	170	150	126
7	140	160	218	179	170	164	248	204	204	164	150	126
8	148	177	208	192	164	170	279	203	200	162	148	140
9	152	184	203	188	162	169	393	196	194	160	146	174
10	152	191	209	189	161	171	429	188	188	144	146	178
11	156	190	207	208	164	170	388	189	186	144	148	170
12	177	188	214	195	168	168	371	190	185	143	154	150
13	210	167	211	200	169	169	334	198	178	142	150	138
14	197	161	213	179	168	158	252	201	172	140	150	140
15	191	173	210	170	173	152	230	197	171	140	154	138
16	188	174	208	172	177	153	258	195	164	141	150	140
17	195	174	197	227	175	185	258	194	158	142	148	182
18	189	179	191	237	177	179	276	202	158	142	142	194
19	186	182	189	235	186	174	287	201	191	140	136	168
20	188	205	188	228	192	237	291	196	197	150	136	142
21	186	212	199	199	192	247	282	194	212	156	146	144
22	180	221	209	194	180	203	275	192	274	160	134	182
23	187	220	226	190	172	195	273	189	268	157	134	180
24	204	212	242	192	172	196	217	180	211	156	134	148
25	218	211	284	174	177	199	217	175	126	171	134	158
26	219	270	261	162	179	200	231	173	127	183	134	184
27	221	257	253	165	181	202	232	171	155	186	136	192
28	226	247	223	180	164	201	224	170	216	169	136	188
29	213	248	205	193	165	209	216	170	242	180	142	164
30	194	271	201	187	---	215	225	169	247	161	148	134
31	186	---	200	182	---	223	---	170	---	155	162	---
TOTAL	5543	6030	6784	5927	4985	5668	8179	6032	5686	5057	4499	4922
MEAN	179	201	219	191	172	183	273	195	190	163	145	164
MAX	226	271	284	237	192	247	429	228	274	259	162	206
MIN	137	160	188	162	160	152	216	169	126	140	134	126
CFSM	.96	1.08	1.18	1.03	.93	.98	1.47	1.05	1.02	.88	.78	.88
IN.	1.11	1.21	1.36	1.19	1.00	1.13	1.64	1.21	1.14	1.01	.90	.98

CAL YR 1979 TOTAL 74598 MEAN 204 MAX 456 MIN 134 CFSM 1.10 IN 14.92
WTR YR 1980 TOTAL 69312 MEAN 189 MAX 429 MIN 126 CFSM 1.02 IN 13.86

04127800 JORDAN RIVER NEAR EAST JORDAN, MI

LOCATION.--Lat 45°06'09", long 85°05'53", in NW¼ NW¼ sec.7, T.31 N., R.6 W., Antrim County, Hydrologic Unit 04060105, on right bank 600 ft (183 m) downstream from Webster Bridge, 4.2 mi (6.8 km) south of East Jordan and 4.5 mi (7.2 km) upstream from mouth.

DRAINAGE AREA.--67.6 mi² (175 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1960-65. October 1966 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 610 ft (186 m), from topographic map. Nov. 19, 1959, to Sept. 30, 1966, nonrecording gage at present site and at site 600 ft (183 m) upstream at same datum.

REMARKS.--Water-discharge records good except those for the winter period and those for the period of no gage-height record, Apr. 24 to June 4, which are fair. Some regulation during the low flows by fish hatchery above station.

AVERAGE DISCHARGE.--14 years, 189 ft³/s (5.352 m³/s), 37.97 in/yr (964 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,360 ft³/s (38.5 m³/s) July 19, 1975, gage height, 6.51 ft (1.984 m); minimum, 109 ft³/s (3.09 m³/s) Mar. 1, 8, 1967, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 400 ft³/s (11.3 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 8	unknown	530	15.0	unknown		June 19	2000	*552	15.6	*5.11	1.558

Minimum discharge, 136 ft³/s (3.85 m³/s) Feb. 29, gage height, 2.82 ft (0.860 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	177	192	188	199	165	170	230	300	200	182	176	176
2	178	186	185	199	165	170	227	270	190	182	174	176
3	182	188	186	194	165	170	217	250	180	178	175	171
4	201	188	185	195	165	170	208	235	180	176	172	168
5	185	182	199	195	165	170	210	230	175	179	172	167
6	186	185	216	195	165	170	215	225	270	179	170	166
7	197	182	204	195	165	170	219	220	232	177	170	166
8	189	186	200	198	165	170	351	215	211	178	171	166
9	189	178	193	198	170	170	372	210	194	176	169	213
10	208	173	194	198	170	170	260	210	186	175	170	182
11	214	167	233	198	170	170	239	220	181	177	172	172
12	237	164	246	198	170	170	232	220	179	177	175	173
13	270	165	190	200	170	175	233	210	177	176	173	223
14	240	163	180	190	170	175	215	215	181	177	172	215
15	205	164	180	185	170	175	256	200	187	179	170	183
16	182	166	180	195	170	182	254	195	182	176	166	193
17	175	164	180	210	175	211	239	190	178	177	166	217
18	170	163	180	220	175	194	250	200	184	177	168	183
19	180	161	178	200	175	199	238	270	354	176	167	180
20	185	164	178	185	175	256	265	230	262	211	166	179
21	180	167	180	175	175	254	220	205	195	192	167	183
22	210	199	207	170	170	207	211	195	186	181	165	195
23	330	196	252	165	170	202	206	185	181	177	164	188
24	259	177	273	165	170	196	205	180	177	175	164	177
25	215	171	260	165	170	191	210	180	177	176	165	182
26	197	300	217	165	170	195	215	175	175	181	165	194
27	210	222	208	165	170	200	225	175	176	187	168	180
28	239	190	206	165	170	202	235	175	202	181	171	177
29	203	185	202	165	167	217	270	175	190	185	170	176
30	194	189	198	165	---	226	320	205	187	178	171	173
31	191	---	195	165	---	230	---	215	---	176	170	---
TOTAL	6378	5475	6273	5777	4912	5927	7247	6580	5929	5574	5254	5494
MEAN	206	183	202	186	169	191	242	212	198	180	169	183
MAX	330	300	273	220	175	256	372	300	354	211	176	223
MIN	170	161	178	165	165	170	205	175	175	175	164	166
CFSM	3.05	2.71	2.99	2.75	2.50	2.83	3.58	3.14	2.93	2.66	2.50	2.71
IN.	3.51	3.01	3.45	3.18	2.70	3.26	3.99	3.62	3.26	3.07	2.89	3.02

CAL YR 1979 TOTAL 75508 MEAN 207 MAX 703 MIN 161 CFSM 3.06 IN 41.55
WTR YR 1980 TOTAL 70820 MEAN 193 MAX 372 MIN 161 CFSM 2.86 IN 38.97

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORDS.--
WATER TEMPERATURES; October 1966 to current year.

INSTRUMENTATION.--Temperature recorder since October 1966.

REMARKS.--Temperature recorder clock stopped Apr. 24 to June 4 (range in temperature 7.0 to 14.5°C); no record Oct. 1-31, Aug. 29 to Sept. 15.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 20.0°C July 11, 1976; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 18.0°C June 26, 27; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1			11.0	10.5	2.5	1.5	1.5	1.0	.0	.0	.0	.0
2			10.5	9.0	1.5	1.5	1.5	1.5	.0	.0	.0	.0
3			9.0	8.0	1.5	1.5	1.5	.0	.0	.0	.0	.0
4			8.0	8.0	2.0	1.5	.0	.0	.0	.0	.0	.0
5			8.0	8.0	3.0	2.0	.0	.0	.0	.0	.0	.0
6			8.0	8.0	3.0	3.0	.0	.0	.0	.0	.0	.0
7			8.0	7.5	3.0	3.0	.0	.0	.0	.0	.5	.0
8			7.5	6.5	3.0	1.5	.0	.0	.0	.0	.5	.0
9			6.5	6.0	1.5	1.0	.0	.0	.0	.0	.5	.0
10			6.0	5.5	2.0	1.0	.0	.0	.0	.0	.5	.5
11			5.5	5.5	2.5	2.0	.0	.0	.0	.0	.5	.0
12			5.5	5.5	2.5	1.0	.0	.0	.0	.0	.0	.0
13			5.5	5.5	1.0	.5	.0	.0	.5	.0	.0	.0
14			5.5	5.5	.5	.5	1.0	.0	1.0	.5	.5	.0
15			5.5	5.0	1.0	.5	1.0	1.0	1.0	1.0	1.0	.5
16			5.0	3.5	.5	.0	1.5	1.0	1.0	.5	2.5	1.0
17			3.5	3.5	.0	.0	1.5	1.5	.5	.0	2.5	2.5
18			5.0	4.0	.0	.0	1.5	1.5	.0	.0	2.5	2.0
19			6.5	5.0	.0	.0	1.5	1.5	1.0	.0	3.5	2.5
20			6.5	6.5	.0	.0	1.5	1.5	2.0	1.0	4.0	3.5
21			6.5	6.5	.5	.0	1.5	1.5	2.0	2.0	4.0	3.5
22			6.5	6.5	2.0	.5	1.5	1.0	2.0	2.0	3.5	3.0
23			6.5	6.0	2.0	2.0	1.0	.5	2.0	2.0	3.5	3.5
24			6.0	5.5	2.0	2.0	.5	.0	2.0	2.0	3.5	3.5
25			5.5	5.0	2.0	1.5	.0	.0	2.0	1.0	3.5	3.0
26			5.0	5.0	1.5	1.5	.0	.0	1.0	.5	4.0	3.0
27			5.0	5.0	1.5	1.5	.0	.0	.5	.0	4.0	4.0
28			5.5	4.5	1.5	1.5	.0	.0	.0	.0	4.0	4.0
29			4.5	4.0	1.5	1.0	.0	.0	.0	.0	4.5	4.0
30			4.0	2.5	1.0	1.0	.0	.0	---	---	5.0	4.0
31			---	---	1.0	1.0	.0	.0	---	---	5.0	4.5
MONTH			11.0	2.5	3.0	.0	1.5	.0	2.0	.0	5.0	.0

04127800 JORDAN RIVER NEAR EAST JORDAN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.5	4.5			---	---	14.0	13.5	16.0	14.5	---	---
2	6.5	5.0			---	---	14.5	12.5	16.0	15.0	---	---
3	6.0	5.0			---	---	15.0	12.5	15.0	14.0	---	---
4	5.0	5.0			---	---	16.5	14.0	15.5	13.5	---	---
5	5.5	4.0			13.5	12.5	16.5	14.5	16.5	15.5	---	---
6	5.5	5.0			13.5	12.5	15.0	12.5	16.5	15.0	---	---
7	5.5	5.5			13.5	13.5	14.5	14.0	16.5	15.0	---	---
8	5.5	5.5			13.5	11.5	16.5	14.0	17.5	16.0	---	---
9	5.5	5.5			12.5	11.5	16.5	14.5	17.5	16.0	---	---
10	5.5	5.0			12.5	10.0	17.0	14.5	16.5	15.0	---	---
11	5.0	5.0			12.0	9.5	17.5	16.0	15.0	14.0	---	---
12	5.0	4.5			13.5	11.5	17.5	14.5	14.0	14.0	---	---
13	4.5	4.0			15.5	13.5	15.5	14.0	14.0	13.0	---	---
14	4.5	4.0			15.5	14.5	15.5	15.5	14.5	13.0	---	---
15	4.0	3.0			14.5	13.0	16.5	15.5	14.5	13.5	---	---
16	4.0	3.0			12.5	10.5	16.5	15.5	14.5	12.5	10.0	10.0
17	5.0	4.0			14.0	11.0	16.0	15.0	13.0	13.0	10.0	10.0
18	7.0	4.5			13.5	13.5	15.0	13.5	14.0	13.0	10.0	9.0
19	8.0	7.0			13.5	12.0	17.0	14.0	14.0	13.5	9.0	9.0
20	9.5	7.0			13.0	10.5	17.0	15.5	15.5	14.0	11.0	9.0
21	9.5	7.5			13.5	12.5	15.5	15.0	16.5	15.5	11.0	11.0
22	11.5	9.0			15.0	13.0	16.0	15.0	16.0	14.5	11.0	10.5
23	11.5	9.0			16.5	14.5	16.0	14.0	15.0	13.5	10.5	9.5
24	---	---			16.5	15.0	15.5	14.0	15.0	13.0	10.0	8.5
25	---	---			17.5	15.5	15.5	14.5	15.0	13.5	8.5	8.5
26	---	---			18.0	16.5	14.5	13.5	15.0	14.5	8.5	8.5
27	---	---			18.0	14.5	13.5	13.0	14.5	13.5	8.5	7.5
28	---	---			14.5	13.0	15.0	13.5	13.5	13.0	7.5	7.0
29	---	---			13.5	13.0	15.5	14.5	---	---	9.0	7.0
30	---	---			14.0	13.0	15.5	14.0	---	---	9.0	9.0
31	---	---			---	---	15.0	14.5	---	---	---	---
MONTH							17.5	12.5				

04127918 PINE RIVER NEAR RUDYARD, MI

LOCATION.--Lat 46°11'09", long 84°35'52", in NW¼ NE¼ sec.30, T.44 N., R.2 W., Chippewa County, Hydrologic Unit 04070002, on right bank 15 ft (5 m) upstream from county highway bridge, 3.2 mi (5.1 km) south of Rudyard.

DRAINAGE AREA.--184 mi^2 (477 km^2).

PERIOD OF RECORD.--April 1972 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map (nearest 10 ft). Prior to Aug. 4, 1972, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--8 years, 246 ft^3/s (6.967 m^3/s), 18.16 in/yr (461 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,190 ft^3/s (119 m^3/s) June 18, 1975, gage height, 17.62 ft (5.371 m); minimum, 56 ft^3/s (1.59 m^3/s) July 28, 1977, gage height, 1.86 ft (0.567 m).

EXTREMES OUTSIDE PERIOD OF RECORD.--A discharge of 50.3 ft^3/s (1.42 m^3/s) was measured Aug. 6, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s (34.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Oct. 23	1300	1,820	51.5	9.31	2.838
Nov. 26	2200	1,810	51.3	9.27	2.825
Apr. 9	0900	*3,910	111	*16.69	5.087
June 14	1000	1,360	38.5	7.48	2.280

Minimum discharge, 68 ft^3/s (1.93 m^3/s) Aug. 1, gage height, 1.98 ft (0.604 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	307	321	165	94	84	450	274	163	110	69	90
2	91	303	300	157	90	84	700	248	156	117	72	86
3	91	275	270	150	86	84	1000	227	177	110	81	83
4	98	256	260	145	84	84	1140	210	157	103	78	80
5	107	239	250	140	82	86	1170	195	138	97	78	78
6	107	392	240	140	80	86	1580	180	136	93	88	75
7	105	374	220	140	80	86	1510	162	193	89	77	71
8	122	369	211	140	80	86	1620	155	317	89	85	70
9	121	355	205	140	80	86	3620	146	237	93	108	81
10	115	294	200	140	78	86	2610	139	193	83	94	110
11	112	251	195	140	78	84	1560	156	163	88	86	91
12	167	230	195	150	78	84	1050	184	135	80	96	82
13	186	234	190	160	78	84	816	169	618	77	97	85
14	190	230	190	180	78	84	612	156	1210	75	103	118
15	175	221	190	200	78	84	922	152	1030	82	112	120
16	161	197	190	250	78	84	775	149	580	86	98	124
17	150	252	190	800	78	84	543	140	361	100	89	215
18	141	273	195	840	78	84	451	135	266	95	83	185
19	173	281	200	660	78	86	495	136	229	87	80	164
20	307	299	205	550	80	90	791	131	233	87	78	146
21	585	282	215	450	80	120	590	123	204	96	78	173
22	568	493	220	350	82	140	478	114	175	90	79	244
23	1440	540	220	260	82	160	401	110	156	84	78	229
24	1310	394	225	200	82	170	340	104	137	79	73	191
25	807	316	225	220	84	175	302	97	120	78	72	174
26	507	1100	220	190	84	180	300	91	117	82	75	194
27	402	1420	215	160	84	190	304	88	119	80	129	191
28	776	874	210	140	84	200	285	90	108	75	174	167
29	585	533	194	120	84	225	274	88	110	73	128	150
30	415	364	182	110	---	260	282	89	118	73	109	136
31	335	---	182	100	---	350	---	133	---	70	99	---
TOTAL	10540	11948	6725	7687	2362	3870	26979	4571	8064	2721	2846	4003
MEAN	340	398	217	248	81.4	125	899	147	269	87.8	91.8	133
MAX	1440	1420	321	840	94	350	3620	274	1210	117	174	244
MIN	91	197	182	100	78	84	274	88	108	70	69	70
CFSM	1.85	2.16	1.18	1.35	.44	.68	4.89	.80	1.46	.48	.50	.72
IN.	2.13	2.42	1.36	1.55	.48	.78	5.45	.92	1.63	.55	.58	.81

CAL YR 1979 TOTAL 121753 MEAN 334 MAX 2770 MIN 62 CFSM 1.82 IN 24.62
WTR YR 1980 TOTAL 92316 MEAN 252 MAX 3620 MIN 69 CFSM 1.37 IN 18.66

04128000 STURGEON RIVER NEAR WOLVERINE, MI

LOCATION.--Lat 45°17'56", long 84°36'40", in SE¼ NE¼ sec.36, T.34 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank 1.8 mi (2.9 km) north of Wolverine, 2.8 mi (4.5 km) downstream from West Branch, and 9 mi (14 km) upstream from mouth.

DRAINAGE AREA.--170 mi² (440 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1307: 1944(M), 1948(M). WSP 1727: 1951(M).

GAGE.--Water-stage recorder. Altitude of gage is 740 ft (226 m), from topographic map. Prior to June 15, 1942, nonrecording gage at site 1.0 mi (1.6 km) upstream, and June 16, 1942, to Sept. 30, 1958, at site 0.7 mi (1.1 km) upstream at different datums.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Prior to July 1975 intermittent regulation at low flows by ponds 2.4 mi (3.9 km) above station.

AVERAGE DISCHARGE.--38 years, 219 ft³/s (6.202 m³/s), 17.49 in/yr (444 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,290 ft³/s (36.5 m³/s) Sept. 29, 1972, gage height, 3.72 ft (1.134 m); maximum gage height, 4.48 ft (1.366 m) Sept. 14, 1961; minimum discharge, 94 ft³/s (2.66 m³/s) Jan. 19, 1971, result of freezeup; minimum daily, 113 ft³/s (3.20 m³/s) Aug. 6, 1958.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 705 ft³/s (20.0 m³/s) Apr. 9, gage height, 2.97 ft (0.905 m); minimum, 123 ft³/s (3.48 m³/s) Feb. 29, gage height, 1.40 ft (0.427 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	183	224	255	240	215	205	322	321	213	192	175	214
2	184	218	260	239	215	205	329	281	208	191	171	214
3	191	214	250	228	215	205	315	263	206	184	172	199
4	209	221	236	195	215	205	278	252	199	178	168	183
5	203	214	245	230	215	205	271	245	194	177	167	178
6	198	224	264	220	215	205	299	238	280	178	164	173
7	208	227	253	230	215	205	320	239	324	183	165	170
8	212	227	248	230	215	205	471	239	304	190	166	168
9	242	221	240	235	215	205	687	237	252	177	161	207
10	240	214	239	240	215	205	559	233	232	174	159	219
11	261	214	285	240	215	205	393	243	216	186	161	189
12	286	214	322	250	215	205	345	238	202	179	168	177
13	283	218	262	260	215	205	341	234	196	173	165	229
14	250	221	247	256	215	205	296	255	194	171	168	284
15	227	218	240	238	210	200	316	228	213	175	165	226
16	218	220	244	234	208	207	336	217	205	172	160	218
17	210	220	260	318	215	228	325	213	195	171	157	315
18	202	224	270	332	215	227	343	264	190	170	160	263
19	211	224	250	283	207	235	349	282	271	168	156	232
20	223	228	227	262	213	313	428	238	352	213	156	217
21	212	232	223	252	217	339	338	221	238	233	156	223
22	214	295	233	241	217	271	314	212	213	197	154	232
23	352	309	311	231	218	253	296	209	204	189	152	236
24	320	265	377	230	217	242	271	205	195	177	152	210
25	251	248	377	235	213	234	264	198	189	173	152	205
26	230	415	299	230	210	237	264	193	188	186	154	213
27	248	401	273	225	210	247	273	193	184	195	158	203
28	304	303	260	215	210	246	285	193	206	191	162	198
29	268	279	256	215	210	268	323	192	209	198	189	195
30	237	264	249	215	---	296	335	227	201	185	380	189
31	227	---	243	215	---	309	---	231	---	177	234	---
TOTAL	7384	7416	8198	7464	6200	7222	10286	7234	6673	5703	5327	6379
MEAN	236	247	264	241	214	233	343	233	222	184	172	213
MAX	352	415	377	332	218	339	687	321	352	233	380	315
MIN	183	214	223	195	207	200	264	192	184	168	152	168
CFSM	1.39	1.45	1.55	1.42	1.26	1.37	2.02	1.37	1.31	1.08	1.01	1.25
IN.	1.60	1.62	1.79	1.63	1.36	1.58	2.25	1.58	1.46	1.25	1.17	1.40

CAL YR 1979 TOTAL 89143 MEAN 244 MAX 882 MIN 163 CFSM 1.44 IN 19.51
WTR YR 1980 TOTAL 85406 MEAN 233 MAX 687 MIN 152 CFSM 1.37 IN 18.69

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: October 1958 to current year.

INSTRUMENTATION.--Temperature recorder since October 1958.

REMARKS.--Temperature recorder clock stopped Dec. 13 to Jan. 13 (range in temperature 0.0 to 1.0ºC), Apr. 27 to June 19 (range in temperature 7.0 to 16.5ºC).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0ºC June 30, 1964; minimum, 0.0ºC on many days during winter perids.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum, 20.5ºC June 26, 27, Aug. 8, 9; minimum, 0.0ºC on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.0	8.0	6.5	6.0	2.0	2.0	---	---	.0	.0	.0	.0
2	9.0	8.5	6.5	5.5	2.0	1.0	---	---	.0	.0	.0	.0
3	9.0	8.5	5.5	5.0	1.0	.5	---	---	.0	.0	.0	.0
4	8.5	7.5	5.0	4.5	1.0	.5	---	---	.0	.0	.0	.0
5	8.0	7.5	4.5	4.5	2.0	1.5	---	---	.0	.0	.0	.0
6	7.5	7.5	4.5	4.5	2.0	2.0	---	---	.0	.0	.0	.0
7	7.5	7.0	4.5	4.5	2.0	1.5	---	---	.0	.0	.0	.0
8	7.0	6.5	4.5	4.5	1.5	1.0	---	---	.0	.0	.0	.0
9	6.5	6.0	4.5	4.0	1.0	1.0	---	---	.0	.0	.0	.0
10	6.0	5.0	4.0	3.5	1.5	1.0	---	---	.0	.0	.0	.0
11	5.0	4.5	3.5	3.5	2.0	1.5	---	---	.0	.0	.0	.0
12	5.0	4.5	3.5	3.0	2.0	1.5	---	---	.0	.0	.0	.0
13	5.0	4.5	3.0	3.0	---	---	---	---	.0	.0	.0	.0
14	4.5	4.5	3.0	3.0	---	---	1.0	1.0	.0	.0	.5	.0
15	5.5	4.5	3.0	3.0	---	---	1.0	1.0	.0	.0	1.0	.5
16	5.5	5.0	3.0	2.5	---	---	2.0	1.0	.0	.0	1.5	.5
17	7.0	5.5	2.5	2.5	---	---	2.5	2.0	.0	.0	1.5	1.5
18	7.0	5.5	2.5	2.0	---	---	2.5	2.5	.0	.0	2.0	1.5
19	7.0	5.5	3.0	2.0	---	---	2.5	2.5	.0	.0	3.0	1.5
20	9.0	7.0	3.5	3.0	---	---	2.5	2.0	.0	.0	3.0	3.0
21	10.0	9.0	3.5	3.5	---	---	2.0	1.5	.0	.0	3.0	2.5
22	10.5	10.0	3.5	3.5	---	---	1.5	1.5	1.0	.0	3.0	2.0
23	10.5	9.0	3.5	3.5	---	---	1.5	1.5	1.0	.0	3.0	3.0
24	9.0	6.5	3.5	3.5	---	---	1.5	1.0	1.5	1.0	3.0	3.0
25	6.5	5.0	3.5	3.0	---	---	1.0	.0	1.5	1.5	3.5	3.0
26	5.0	4.5	3.0	3.0	---	---	.0	.0	1.5	1.0	4.0	2.5
27	4.5	4.5	3.0	3.0	---	---	.0	.0	1.0	.0	4.0	3.0
28	4.5	4.5	3.0	3.0	---	---	.0	.0	.0	.0	4.0	3.0
29	4.5	4.5	3.0	2.0	---	---	.0	.0	.0	.0	4.0	3.0
30	4.5	4.0	2.0	2.0	---	---	.0	.0	---	---	4.5	3.0
31	6.0	4.0	---	---	---	---	.0	.0	---	---	4.5	4.0
MONTH	11.0	4.0	6.5	2.0					1.5	.0	4.5	.0

04128000 STURGEON RIVER NEAR WOLVERINE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	4.5	4.0			---	---	15.5	13.5	19.0	15.5	17.0	16.0
2	5.0	4.5			---	---	16.5	12.5	19.0	16.0	16.5	16.0
3	5.0	4.0			---	---	17.0	13.0	18.0	14.5	17.0	15.0
4	4.0	4.0			---	---	18.5	14.0	18.5	15.0	18.0	16.0
5	5.5	3.0			---	---	18.5	16.5	19.5	17.0	18.0	16.0
6	5.5	4.5			---	---	17.5	13.5	19.5	16.5	17.0	16.0
7	4.5	4.5			---	---	17.0	14.0	19.5	17.0	17.0	15.5
8	4.5	4.0			---	---	18.5	15.0	20.5	18.0	17.5	15.5
9	4.0	3.5			---	---	18.0	15.0	20.5	17.5	17.5	16.5
10	4.0	4.0			---	---	19.0	15.0	19.0	16.5	16.5	14.5
11	4.0	4.0			---	---	19.5	16.5	18.0	15.5	15.5	14.5
12	4.0	3.5			---	---	19.5	15.5	16.0	15.0	15.5	14.5
13	3.5	3.5			---	---	18.0	14.5	16.0	14.0	14.5	14.5
14	3.5	3.0			---	---	18.0	16.0	17.0	14.0	14.5	14.5
15	3.0	3.0			---	---	19.0	17.0	17.0	15.0	14.5	13.0
16	4.5	2.5			---	---	18.5	16.0	17.0	14.5	13.5	13.5
17	5.0	4.0			---	---	18.0	16.0	16.5	15.0	13.5	13.0
18	7.5	4.0			---	---	17.0	14.5	17.5	15.0	13.5	12.0
19	8.5	6.0			---	---	19.5	16.0	17.5	15.0	12.5	12.0
20	8.5	6.0			14.5	11.0	19.0	16.0	18.5	16.0	14.0	12.5
21	9.5	6.5			15.0	12.0	17.0	16.5	19.0	17.5	14.0	13.5
22	11.5	8.0			16.5	13.5	17.0	15.5	19.0	17.0	13.5	13.5
23	11.0	8.5			18.5	14.5	18.0	14.5	19.0	15.5	13.5	12.0
24	8.0	6.5			19.0	15.5	18.5	15.5	19.0	16.0	12.5	11.0
25	7.0	6.0			19.5	16.0	18.0	16.0	19.0	16.5	11.0	10.5
26	7.0	7.0			20.5	17.5	16.5	15.0	19.0	17.5	10.5	10.5
27	---	---			20.5	15.5	15.0	14.0	17.5	16.0	10.5	9.5
28	---	---			15.5	13.5	17.0	14.0	16.0	15.5	9.5	8.5
29	---	---			13.5	13.0	18.0	15.0	16.5	15.0	11.0	9.0
30	---	---			15.5	13.0	18.0	14.5	17.5	16.5	11.5	11.0
31	---	---			---	---	17.0	15.0	17.5	17.0	---	---
MONTH							19.5	12.5	20.5	14.0	18.0	8.5

04128500 INDIAN RIVER AT INDIAN RIVER, MI

LOCATION.--Lat 45°24'38", long 84°37'12", in NE¼ SW¼ sec.24, T.35 N., R.3 W., Cheboygan County, Hydrologic Unit 04070004, on left bank in Indian River, 500 ft (152 m) downstream from Burt Lake, and 2.3 mi (3.7 km) upstream from Mullett Lake.

DRAINAGE AREA.--583 mi^2 (1,510 km^2).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1942(M), 1945(M), 1947.

GAGE.--Water-stage recorder. Datum of gage is 590.21 ft (179.896 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 12, 1942, nonrecording gage at site 100 ft (30 m) downstream. Auxiliary water-stage recorder 14.3 mi (23.0 km) downstream from base gage, near Cheboygan, datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by dam at Cheboygan. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 572 ft^3/s (16.20 m^3/s), 13.32 in/yr (338 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,250 ft^3/s (35.4 m^3/s) May 3, 4, 1979; maximum daily gage height, 5.58 ft (1.701 m) May 13, 14, 1960; minimum daily discharge, 212 ft^3/s (6.00 m^3/s) Sept. 2, 1970; minimum daily gage height, 3.34 ft (1.018 m) Oct. 21, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 738 ft^3/s (27.2 m^3/s) Dec. 1; maximum daily gage height, 4.44 ft (1.353 m), Apr. 23; minimum daily discharge, 280 ft^3/s (7.93 m^3/s) Aug. 27; minimum daily gage height, 3.46 ft (1.055 m) Mar. 16, 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	444	570	783	667	696	588	539	715	514	531	374	430
2	449	605	760	664	690	584	540	695	516	550	360	410
3	438	652	738	657	688	582	542	697	534	542	350	400
4	444	654	765	652	684	585	550	690	526	554	325	370
5	439	659	754	656	682	585	548	684	513	565	336	360
6	447	684	761	652	679	585	551	656	535	558	362	350
7	464	653	770	659	676	581	550	658	549	548	385	350
8	443	658	767	666	676	580	556	645	562	583	401	360
9	449	675	750	672	664	574	562	616	565	565	426	375
10	435	696	747	674	661	573	591	602	577	569	437	370
11	439	689	751	672	656	570	600	602	567	582	449	355
12	447	671	765	698	656	566	617	597	570	576	428	350
13	459	697	744	682	654	556	621	612	573	562	455	365
14	431	700	742	690	655	555	628	616	593	553	458	355
15	427	704	707	690	649	555	656	598	612	565	458	339
16	424	679	760	695	647	547	666	582	605	551	439	359
17	427	696	746	693	645	541	669	572	582	549	406	403
18	410	703	762	697	639	535	676	584	579	524	390	400
19	403	704	754	705	633	528	692	574	590	525	385	401
20	432	716	741	700	618	527	685	584	586	530	369	414
21	450	718	734	698	613	530	695	581	573	529	351	414
22	456	726	731	702	605	534	685	572	566	510	352	440
23	498	721	727	709	597	530	709	575	560	488	336	456
24	552	713	731	708	591	526	689	557	554	459	321	446
25	573	725	731	704	586	530	679	554	540	456	303	444
26	578	739	715	707	590	533	689	535	527	460	299	460
27	584	745	704	706	588	531	695	522	537	442	280	434
28	625	763	696	707	590	525	699	513	530	424	301	433
29	631	776	687	708	588	539	701	510	533	420	359	423
30	626	781	680	704	---	540	706	512	540	411	390	431
31	616	---	673	698	---	536	---	513	---	398	440	---
TOTAL	14940	20872	22876	21292	18596	17151	18986	18523	16708	16079	11725	11897
MEAN	482	696	738	687	641	553	633	598	557	519	378	397
MAX	631	781	783	709	696	588	709	715	612	583	458	460
MIN	403	570	673	652	586	525	539	510	513	398	280	339
CFSM	.83	1.19	1.27	1.18	1.10	.95	1.09	1.03	.96	.89	.65	.68
IN.	.95	1.33	1.46	1.36	1.19	1.09	1.21	1.18	1.07	1.03	.75	.76

CAL YR 1979 TOTAL 257000 MEAN 704 MAX 1250 MIN 403 CFSM 1.21 IN 16.40
WTR YR 1980 TOTAL 209645 MEAN 573 MAX 783 MIN 280 CFSM .98 IN 13.38

04129000 PIGEON RIVER NEAR VANDERBILT, MI

LOCATION.--Lat 45°10'15", long 84°26'18", in SE¼ SW¼ sec.9, T.32 N., R.1 W., Otsego County, Hydrologic Unit 04070004, on right bank at Pigeon River Headquarters, 11.1 mi (17.9 km) east of Vanderbilt, and 26 mi (41.8 km) upstream from Mullett Lake.

DRAINAGE AREA.--63 mi² (160 km²), approximately.

PERIOD OF RECORD.--September 1950 to current year.

GAGE.--Water-stage recorder. Datum of gage is 886.24 ft (270.126 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam, 3.5 mi (5.6 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 78.1 ft³/s (2.212 m³/s), 16.83 in/yr (427 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) May 15, 1957, gage height, 6.80 ft (2.073 m), from floodmark, from rating curve extended above 500 ft³/s (14.2 m³/s), result of failure of Lansing Club Dam; minimum, 13 ft³/s (0.37 m³/s) Jan. 8, 1957.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 360 ft³/s (10.2 m³/s) Apr. 9, gage height, 4.65 ft (1.417 m); minimum, 30 ft³/s (0.85 m³/s) Nov. 13; minimum gage height, 1.70 ft (0.518 m) Aug. 22.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	54	77	72	80	62	62	101	123	73	65	57	69
2	56	74	74	78	62	62	105	103	67	62	56	76
3	62	71	71	77	62	62	103	98	68	56	55	65
4	67	70	70	76	62	61	95	86	65	56	62	63
5	70	70	70	70	62	61	83	87	64	56	54	61
6	68	70	84	73	62	61	105	76	108	60	55	56
7	67	71	79	77	62	59	114	79	122	58	60	55
8	70	69	79	80	62	61	192	78	113	62	57	56
9	76	70	75	82	62	62	332	76	93	54	55	73
10	80	66	74	84	62	60	205	74	75	55	54	72
11	83	63	78	89	62	62	137	82	69	68	57	63
12	90	68	79	114	62	62	116	82	66	57	56	62
13	96	66	78	101	62	61	114	88	65	62	60	72
14	88	72	74	94	62	61	95	97	58	55	58	78
15	81	77	78	85	62	62	112	79	75	62	57	67
16	76	69	76	82	62	59	118	76	69	54	57	71
17	72	64	75	96	62	62	104	76	61	56	56	106
18	69	80	71	113	62	63	119	101	61	57	57	89
19	70	69	74	96	62	64	134	107	106	58	56	71
20	74	71	70	82	62	64	202	90	170	67	57	70
21	72	77	72	81	62	64	137	74	96	80	55	67
22	70	95	72	76	61	66	118	76	75	66	48	79
23	210	118	100	76	60	66	114	68	67	65	59	84
24	155	86	145	74	61	66	98	67	63	58	53	74
25	98	79	150	70	62	66	89	63	60	59	57	67
26	86	151	105	69	62	73	91	63	59	60	55	69
27	79	169	95	66	62	73	95	62	58	68	55	70
28	101	101	85	65	62	73	102	63	64	66	57	64
29	100	91	84	63	62	81	135	62	73	64	79	64
30	75	83	84	62	---	87	138	85	66	64	99	64
31	74	---	77	62	---	98	---	71	---	59	71	---
TOTAL	2589	2457	2570	2493	1794	2044	3803	2512	2329	1889	1824	2097
MEAN	83.5	81.9	82.9	80.4	61.9	65.9	127	81.0	77.6	60.9	58.8	69.9
MAX	210	169	150	114	62	98	332	123	170	80	99	106
MIN	54	63	70	62	60	59	83	62	58	54	48	55
CFSM	1.33	1.30	1.32	1.28	.98	1.05	2.02	1.29	1.23	.97	.93	1.11
IN.	1.53	1.45	1.52	1.47	1.06	1.21	2.25	1.48	1.38	1.12	1.08	1.24

CAL YR 1979 TOTAL 30698 MEAN 84.1 MAX 384 MIN 47 CFSM 1.34 IN 18.13
WTR YR 1980 TOTAL 28401 MEAN 77.6 MAX 332 MIN 48 CFSM 1.23 IN 16.77

04129500 PIGEON RIVER AT AFTON, MI

LOCATION.--Lat 45°22'26", long 84°30'54", in NW¼ NE¼ sec.2, T.34 N., R.2 W., Cheboygan County, Hydrologic Unit 04070004, on downstream side of bridge on State Highway 68, 0.9 mi (1.4 km) west of Afton, 2.2 mi (3.5 km) downstream from Wilkes Creek, and 7 mi (11 km) upstream from Mullett Lake.

DRAINAGE AREA.--159 mi^2 (412 km^2).

PERIOD OF RECORD.--April 1942 to current year.

REVISED RECORDS.--WSP 1437: 1945-46, 1950.

GAGE.--Nonrecording gage. Altitude of gage 675 ft (206 m), by barometer. Prior to Oct. 1, 1961, at various sites upstream at present datum.

REMARKS.--Records fair except those for the winter period, which are poor. Prior to May 16, 1957, and since Apr. 22, 1958, occasional regulation by Lansing Club Dam 22 mi (35 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 140 ft^3/s (3.965 m^3/s), 11.96 in/yr (304 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,170 ft^3/s (33.1 m^3/s) Apr. 17, 1960, gage height, 6.80 ft (2.073 m), from high-water mark; maximum gage height, about 10.5 ft (3.20 m) Mar. 31, 1943, from floodmarks, backwater from ice; minimum discharge, 47 ft^3/s (1.33 m^3/s) Aug. 13, 1980.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 390 ft^3/s (11.0 m^3/s) Apr. 11, gage height, 5.55 ft (1.692 m); maximum gage height, 6.98 ft (2.128 m) Mar. 23, backwater from ice; minimum discharge, 47 ft^3/s (1.33 m^3/s) Aug. 13, gage height, 4.37 ft (1.332 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	91	156	149	140	80	80	208	248	112	87	87	99
2	93	151	144	132	80	80	204	219	114	97	87	89
3	101	149	142	125	80	81	208	181	112	99	77	87
4	105	144	140	121	80	81	186	167	109	99	79	72
5	107	142	140	120	80	81	184	156	103	97	81	68
6	105	133	140	128	81	81	214	142	126	89	79	79
7	112	135	140	140	81	81	211	142	179	83	85	79
8	112	131	140	150	81	81	238	129	165	95	66	77
9	118	133	140	160	82	81	248	129	186	93	79	85
10	126	137	140	170	82	82	248	129	151	97	77	83
11	135	135	140	185	82	82	333	124	129	103	72	81
12	144	124	140	200	82	82	316	135	118	114	79	81
13	151	120	140	220	82	82	262	140	118	101	58	87
14	146	124	140	200	82	82	248	140	101	99	85	122
15	137	137	133	190	82	82	232	133	114	95	85	107
16	131	140	123	185	82	82	282	124	120	91	56	101
17	129	131	114	198	81	82	259	121	120	91	81	133
18	124	126	120	210	81	83	246	120	107	95	79	140
19	129	135	130	220	81	84	273	149	109	95	72	114
20	133	129	140	195	81	86	303	144	179	114	73	85
21	142	126	150	165	81	87	291	140	181	137	66	99
22	142	151	158	140	81	89	256	131	151	116	72	112
23	174	179	194	130	80	92	224	118	129	95	77	107
24	214	186	227	115	80	98	198	97	112	91	83	103
25	227	167	254	105	80	110	172	95	109	89	75	93
26	169	201	243	94	80	120	172	99	95	95	79	85
27	169	259	206	88	80	137	179	95	91	99	79	97
28	184	265	196	84	80	151	158	97	101	97	79	93
29	189	206	160	82	80	165	151	97	109	99	101	91
30	179	172	152	81	---	131	206	109	114	101	137	85
31	167	---	145	80	---	177	---	129	---	77	107	---
TOTAL	4385	4624	4820	4553	2345	2993	6910	4179	3764	3030	2492	2834
MEAN	141	154	155	147	80.9	96.5	230	135	125	97.7	80.4	94.5
MAX	227	265	254	220	82	177	333	248	186	137	137	140
MIN	91	120	114	80	80	80	151	95	91	77	56	68
CFSM	.89	.97	.98	.93	.51	.61	1.45	.85	.79	.61	.51	.59
IN.	1.03	1.08	1.13	1.07	.55	.70	1.62	.98	.88	.71	.58	.66

CAL YR 1979 TOTAL 58743 MEAN 161 MAX 739 MIN 85 CFSM 1.01 IN 13.74
WTR YR 1980 TOTAL 46929 MEAN 128 MAX 333 MIN 56 CFSM .81 IN 10.98

04130000 CHEBOYGAN RIVER NEAR CHEBOYGAN, MI

LOCATION.--Lat 45°34'38", long 84°29'15", in SW¼ sec.19, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, on right bank 300 ft (91 m) downstream from Mullett Lake, 2.4 mi (3.9 km) upstream from Black River, and 4.8 mi (7.7 km) south of Cheboygan.

DRAINAGE AREA.--865 mi² (2,240 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

GAGE.--Water-stage recorder. Datum of gage is 591.21 ft (180.201 m) National Geodetic Vertical Datum of 1929. Auxiliary water-stage recorder 5.1 mi (8.2 km) downstream from base gage, in Cheboygan, datum of gage is 590.00 ft (179.832 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 30, 1967, nonrecording auxiliary gage in Cheboygan, 5.2 mi (8.4 km) downstream at present datum.

REMARKS.--Records good. Flow regulated by dam in Cheboygan; prior to Dec. 31, 1965, flow affected by variable backwater from powerplant in Cheboygan 5.2 mi (8.4 km) below station and by Alverno powerplant.

AVERAGE DISCHARGE.--38 years, 826 ft³/s (23.39 m³/s), 12.97 in/yr (329 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 1,970 ft³/s (55.8 m³/s) May 22, 1979; maximum daily gage height, 3.27 ft (0.997 m) May 13, 14, 1960; minimum daily discharge, 90 ft³/s (2.55 m³/s) Mar. 29, 30, 1958; minimum daily gage height, 1.05 ft (0.320 m) Apr. 13, 14, 15, 1975.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,260 ft³/s (35.7 m³/s) Apr. 29; maximum daily gage height recorded, 2.55 ft (0.777 m) June 26; minimum daily discharge, 393 ft³/s (11.1 m³/s) Sept. 15; minimum daily gage height, 1.37 ft (0.418 m) Feb. 18, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	559	997	1120	881	1180	992	1110	1220	730	759	501	510
2	570	1040	1120	890	1200	990	1120	1120	737	760	486	500
3	559	1180	1040	897	1220	985	1140	1120	768	756	490	490
4	560	1200	1120	930	1200	992	1160	1120	760	784	550	480
5	563	1200	1130	991	1160	1000	1180	1050	753	792	597	465
6	558	1190	1120	999	1160	989	1170	886	741	788	733	450
7	570	1170	1070	990	1170	993	1150	841	721	788	714	440
8	566	1150	1100	1020	1150	1000	1050	872	728	800	745	440
9	565	1190	1040	1040	1110	994	1010	857	735	824	772	450
10	567	1210	1050	1040	1110	987	1210	821	857	808	828	445
11	561	1220	1040	1040	1110	1020	1190	819	866	791	836	430
12	575	1210	1050	1130	1110	995	1160	839	865	755	851	410
13	571	1220	1060	1110	1090	947	1130	939	850	758	736	405
14	568	1220	1060	1120	1100	947	1120	932	855	753	629	400
15	573	1180	1070	1130	1100	942	1140	800	876	744	597	393
16	572	1160	1110	1120	1120	935	1210	771	861	661	541	414
17	577	1120	1130	1020	1120	943	1200	771	796	682	507	536
18	593	1130	1100	1040	1110	940	1200	766	675	677	487	542
19	691	1130	1110	1070	1040	894	1210	775	686	676	495	504
20	797	1140	1080	1080	871	857	1200	837	668	690	489	542
21	772	1140	1070	1070	869	1010	1210	837	658	619	460	576
22	862	1130	1010	1070	870	1030	1210	815	703	555	486	588
23	928	1100	981	1120	859	1010	1220	792	651	551	475	636
24	1060	1090	943	1100	855	1020	1220	664	640	548	462	607
25	1190	1100	954	1100	893	1080	1220	670	633	558	457	523
26	1200	1050	928	1110	968	1070	1230	662	634	582	478	575
27	1190	1020	917	1120	983	1050	1240	659	688	568	494	554
28	1180	1100	901	1130	990	967	1250	673	721	559	511	572
29	1210	1100	888	1140	997	1140	1260	722	736	559	442	572
30	1110	1110	884	1160	---	1140	1250	733	744	548	475	530
31	1040	---	879	1170	---	1140	---	703	---	535	520	---
TOTAL	23465	34197	32075	32828	30715	30999	35370	26086	22336	21228	17844	14979
MEAN	757	1140	1035	1059	1059	1000	1179	841	745	685	576	499
MAX	1210	1220	1130	1170	1220	1140	1260	1220	876	824	851	636
MIN	559	997	879	881	855	857	1010	659	633	535	442	393
CFSM	.87	1.32	1.20	1.22	1.22	1.16	1.36	.97	.86	.79	.67	.58
IN.	1.01	1.47	1.38	1.41	1.32	1.33	1.52	1.12	.96	.91	.77	.64

CAL YR 1979 TOTAL 390975 MEAN 1071 MAX 1970 MIN 511 CFSM 1.24 IN 16.81
WTR YR 1980 TOTAL 322102 MEAN 880 MAX 1260 MIN 393 CFSM 1.02 IN 13.85

04130500 BLACK RIVER NEAR TOWER, MI

LOCATION.--Lat 45°23'33", long 84°20'00", in SE¼ NE¼ sec.29, T.35 N., R.1 E., Cheboygan County, Hydrologic Unit 04070005, on right bank 400 ft (122 m) downstream from Kleber Dam, 1,000 ft (305 m) upstream from Milligan Creek, 3.0 mi (4.8 km) northwest of Tower, and 10.8 mi (17.4 km) upstream from Black Lake.

DRAINAGE AREA.--313 mi² (811 km²).

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for October 1942, published in WSP 1307.

REVISED RECORDS.--WSP 1307: 1942.

GAGE.--Water-stage recorder. Datum of gage is 658.00 ft (200.558 m) Stanley Engineering Co. datum. Prior to Aug. 1, 1949, at site 1 mi (1.6 km) upstream at different datum.

REMARKS.--Records good except those for the period of no gage-height record, May 1 to June 5, which are poor. Flow regulated by hydroelectric powerplant 400 ft (122 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--38 years, 271 ft³/s (7.675 m³/s), 11.76 in/yr (299 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,340 ft³/s (66.3 m³/s) Apr. 17, 1960, gage height, 7.13 ft (2.173 m); minimum, 0.60 ft³/s (0.017 m³/s) Mar. 11, 1950; minimum daily, 4.0 ft³/s (0.11 m³/s) Nov. 27, 1949.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,180 ft³/s (33.4 m³/s) Apr. 10, 11, gage height, 5.05 ft (1.539 m); minimum, 12 ft³/s (0.34 m³/s) July 25, gage height, 1.22 ft (0.372 m); minimum daily, 138 ft³/s (3.91 m³/s) Aug. 26.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	183	341	340	282	186	161	378	620	270	252	199	313
2	156	235	230	286	187	151	384	620	250	184	177	221
3	156	237	162	238	197	188	370	640	245	174	179	192
4	162	216	195	172	188	227	335	620	240	197	178	192
5	176	213	311	142	189	190	366	590	240	190	144	192
6	190	235	337	142	188	189	417	550	232	168	145	193
7	213	235	268	204	187	181	786	450	323	191	144	192
8	213	235	233	240	174	155	1040	380	450	187	145	149
9	225	233	221	179	147	180	1060	350	346	186	156	147
10	232	233	204	197	152	185	1150	300	414	185	198	181
11	232	233	297	298	156	185	1100	320	456	184	144	170
12	250	233	298	241	156	187	806	330	253	153	146	171
13	290	230	241	240	174	187	640	320	208	153	146	196
14	288	230	256	277	181	187	709	330	212	153	153	236
15	242	230	228	307	189	185	581	390	229	205	145	215
16	225	230	228	310	196	185	634	340	256	147	146	237
17	225	161	198	319	196	249	667	345	261	151	145	233
18	230	159	139	399	195	253	635	350	254	152	145	235
19	235	228	168	400	176	462	729	430	216	149	142	250
20	228	244	207	340	176	386	697	290	359	157	140	270
21	178	225	299	300	176	398	750	420	406	198	139	250
22	240	265	313	295	195	390	685	450	337	239	140	238
23	258	423	362	241	203	332	581	300	372	215	141	200
24	383	325	394	169	248	246	472	280	256	219	141	205
25	383	218	476	169	213	323	505	290	254	155	140	230
26	380	246	520	181	182	313	504	300	231	205	138	250
27	380	432	463	294	183	308	469	190	220	152	139	240
28	372	432	447	252	189	247	469	200	170	181	142	210
29	328	430	443	188	225	420	582	220	184	202	155	160
30	242	425	355	190	---	365	639	220	307	208	206	140
31	339	---	262	223	---	367	---	260	---	210	363	---
TOTAL	7836	8012	9135	7705	5394	7982	19140	11695	8451	5702	4961	6300
MEAN	253	267	295	249	186	257	638	377	282	184	160	210
MAX	383	432	520	400	249	462	1150	640	456	252	363	313
MIN	156	159	139	142	147	151	335	190	170	147	138	140
CFSM	.81	.85	.94	.80	.59	.82	2.04	1.20	.90	.59	.51	.67
IN.	.93	.95	1.09	.92	.64	.95	2.27	1.39	1.00	.68	.59	.75

CAL YR 1979 TOTAL 121718 MEAN 333 MAX 1250 MIN 132 CFSM 1.06 IN 14.47
WTR YR 1980 TOTAL 102311 MEAN 280 MAX 1150 MIN 138 CFSM .90 IN 12.16

04131500 RAINY RIVER NEAR OCQUEOC, MI

LOCATION.--Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, Hydrologic Unit 04070005, on upstream side of highway bridge, 4.4 mi (7.1 km) west of Ocqueoc, and 5 mi (8 km) upstream from Black Lake.

DRAINAGE AREA.--85 mi² (220 km²), approximately.

PERIOD OF RECORD.--October 1952 to December 1979 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

GAGE.--Nonrecording gage. Datum of gage is 674.85 ft (205.694 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years, 42.3 ft³/s (1.198 m³/s), 6.76 in/yr (172 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 946 ft³/s (26.8 m³/s) Apr. 18, 1960, gage height, 6.33 ft (1.929 m), from floodmark; minimum, 0.4 ft³/s (0.011 m³/s) Sept. 7, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge during period October 1979 to December 1979, 113 ft³/s (3.20 m³/s) Dec. 26, gage height, 2.86 ft (0.872 m); maximum gage height, 2.89 ft (0.881 m) Dec. 2, backwater from ice; minimum discharge, 3.2 ft³/s (0.091 m³/s) Oct. 1, gage height, 1.55 ft (0.472 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.2	30	66									
2	3.3	27	100									
3	3.6	24	58									
4	4.2	26	31									
5	4.4	24	30									
6	4.2	24	33									
7	5.1	24	32									
8	5.4	23	31									
9	7.0	21	38									
10	7.0	20	34									
11	7.0	18	31									
12	7.9	16	41									
13	8.5	17	40									
14	8.2	18	31									
15	8.2	17	31									
16	7.9	18	36									
17	8.2	17	39									
18	7.6	18	42									
19	8.2	19	37									
20	8.8	20	35									
21	8.8	19	30									
22	13	21	28									
23	37	32	60									
24	37	30	91									
25	29	37	104									
26	24	75	112									
27	24	80	98									
28	42	75	79									
29	39	67	78									
30	33	55	76									
31	31	---	75									
TOTAL	445.7	912	1647	---	---	---	---	---	---	---	---	---
MEAN	14.4	30.4	53.1	---	---	---	---	---	---	---	---	---
MAX	42	80	112	---	---	---	---	---	---	---	---	---
MIN	3.2	16	28	---	---	---	---	---	---	---	---	---
CFSM	.17	.36	.63	---	---	---	---	---	---	---	---	---
IN.	.20	.40	.72	---	---	---	---	---	---	---	---	---

CAL YR 1979 TOTAL 23109.8 MEAN 63.3 MAX 582 MIN 3.2 CFSM .75 IN 10.11

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°38'02", long 84°28'52", in NW¼ NE¼ sec.6, T.37 N., R.1 W., Cheboygan County, Hydrologic Unit 04070004, at upstream side of bridge on Lincoln Avenue in Cheboygan, 1.75 mi (2.8 km) upstream from mouth.

DRAINAGE AREA.--1,500 mi² (3,900 km²), approximately.

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water quality monitor since October 1976.

REMARKS.--In addition to water-quality monitor, samples were collected near monitor site by a local observer on an approximate twice-weekly basis. Interruptions in the record were due to malfunctions of the instrument. Flow regulated by dam 1,000 ft (305 m) downstream. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

COOPERATION.--Pesticide samples were collected by the U.S. Geological Survey and analyzed by the U.S. Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE (water years 1976-80): Maximum, 424 micromhos Jan. 21, 1976; minimum, 262 micromhos Aug. 31, 1977.
WATER TEMPERATURES (water years 1976-80): Maximum, 27.0°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES OUTSIDE PERIOD OF DAILY RECORD.--Specific conductance values 800, 850 and 900 micromhos Apr. 7, 8, 24 and 25, 1975 and 140 micromhos Mar. 8, 1975, were observed.*

* These values are questionable due to possible changes in sampling location.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, CHEM-ICAL (HIGH LEVEL) (MG/L)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)
OCT											
05...	1000	693	299	7.8	15.0	8.2	83	--	K1100	57	160
NOV											
09...	1130	1990	293	7.9	5.0	11.7	94	46	31	20	160
DEC											
06...	0930	1760	301	8.0	1.5	12.5	92	3	31	26	160
JAN											
11...	1000	1720	306	7.8	.5	13.2	96	18	100	K3	170
FEB											
05...	1300	1570	316	7.9	.0	--	--	20	<1	<1	170
MAR											
14...	0930	1160	309	7.7	.5	1.4	103	--	K10	K16	170
APR											
18...	1000	E2840	286	7.8	4.5	13.2	106	39	K5	K16	150
MAY											
06...	1300	E1900	284	7.8	14.0	10.4	104	10	31	K7	160
JUN											
04...	1130	1180	305	8.2	16.0	9.1	94	--	100	K20	150
JUL											
08...	1400	1150	249	8.2	21.5	8.6	98	10	--	K5	150
AUG											
05...	1000	980	290	8.0	24.0	9.3	111	19	K13	K4	160
SEP											
09...	1330	E952	284	8.0	22.0	8.7	100	--	110	45	150

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)
OCT											
05...	7	42	14	0	3.4	4	.1	.8	190	0	160
NOV											
09...	12	44	12	0	3.9	7	.1	.8	180	0	150
DEC											
06...	3	44	12	--	3.6	7	.1	.7	190	0	160
JAN											
11...	21	46	13	0	4.0	7	.1	.8	180	0	150
FEB											
05...	4	46	13	0	4.0	5	.1	.8	200	0	160
MAR											
14...	14	45	13	--	3.9	5	.1	.7	190	0	160
APR											
18...	7	42	12	0	3.3	4	.1	.8	180	0	150
MAY											
06...	17	43	12	0	4.3	6	.2	.7	170	0	140
JUN											
04...	14	42	12	--	3.8	5	.1	.6	170	0	140
JUL											
08...	11	40	13	--	4.8	6	.2	.8	170	0	140
AUG											
05...	6	41	13	0	4.2	6	.1	.8	170	0	150
SEP											
09...	11	37	14	0	3.6	5	.1	.8	170	0	140

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS- PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT										
05...	4.8	12	4.7	.2	6.7	180	178	337	--	--
NOV										
09...	3.6	8.9	4.0	.2	7.8	190	171	1020	7	190
DEC										
06...	3.0	11	4.6	.2	7.7	184	178	874	164	202
JAN										
11...	4.6	14	5.3	.2	7.7	184	180	855	19	195
FEB										
05...	4.0	14	4.9	.2	7.8	185	190	784	0	184
MAR										
14...	6.1	12	4.8	.2	8.0	189	182	592	--	--
APR										
18...	4.6	9.9	4.4	.0	6.7	177	168	E1360	28	197
MAY										
06...	4.3	11	4.4	.2	7.0	172	167	E882	7	185
JUN										
04...	1.7	11	4.6	.2	6.3	193	165	615	--	--
JUL										
08...	1.7	12	4.5	.2	6.2	180	165	559	--	--
AUG										
06...	2.9	12	5.0	.2	7.6	188	174	497	16	177
SEP										
09...	2.7	13	4.7	.2	7.6	180	165	E463	2	179

DATE	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)
OCT										
05...	.01	.02	.050	.010	.06	.20	.25	.26	1.2	.010
NOV										
09...	.09	.06	.020	.020	.02	.36	.38	.47	2.1	.010
DEC										
06...	--	.07	.070	.000	.08	.29	.36	--	--	.010
JAN										
11...	.10	.11	.060	.020	.07	.20	.26	.36	1.6	.010
FEB										
05...	.08	.08	.050	.060	--	.22	.27	.35	1.6	.010
MAR										
14...	.10	.11	--	.040	--	--	.22	.32	1.4	.010
APR										
18...	.11	.11	.030	.010	.04	.21	.24	.35	1.6	.010
MAY										
06...	.05	.05	.010	.000	.01	.17	.18	.23	1.0	.020
JUN										
04...	.04	.04	.020	.000	.02	.20	.22	.26	1.2	.010
JUL										
08...	.01	.01	.000	.000	.00	.28	.28	.29	1.3	.160
AUG										
06...	.01	.00	.020	.000	.02	.21	.23	.24	1.1	.010
SEP										
09...	.01	.01	.020	.020	.02	.37	.39	.40	1.8	.000

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 05...	.03	.000	--	--	--	--	--	2	3.7	100
NOV 09...	.03	.010	.000	.00	1.10	.000	6.0	4	21	100
DEC 06...	.03	.000	.000	.00	3.98	.000	6.5	4	19	100
JAN 11...	.03	.010	.000	.00	1.51	.000	--	4	19	100
FEB 05...	.03	.000	.020	.06	2.30	.000	4.4	5	21	100
MAR 14...	.03	.000	--	--	1.62	.000	7.7	1	3.1	100
APR 18...	.03	.000	.010	.03	1.42	.000	--	3	E23	100
MAY 05...	.06	.000	.000	.00	3.33	.000	12	4	E21	100
JUN 04...	.03	.020	--	--	1.14	.000	13	5	16	100
JUL 08...	.49	.170	--	--	1.24	.000	4.7	4	12	100
AUG 06...	.03	.000	.000	.00	1.71	.000	9.7	4	11	100
SEP 09...	.00	.000	.010	.03	1.81	.000	--	4	E10	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT 05...	1000	4	2	100	30	--	3	--	10	0	0
JAN 11...	1000	2	2	--	30	0	0	20	20	0	0
APR 18...	1000	2	1	<50	20	--	2	20	10	0	0
SEP 09...	1330	1	1	100	0	0	0	20	10	0	0

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT 05...	2	2	190	10	4	0	--	--	3	<.5	<.5
JAN 11...	4	2	110	10	3	0	--	10	0	.2	.1
APR 18...	5	0	140	20	3	0	--	10	3	.2	.1
SEP 09...	4	4	160	80	1	1	0	10	0	.4	.5

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT 05...	0	0	0	0	0	--	0	4.3	--	--	--
JAN 11...	1	1	0	0	0	20	20	4.4	.1	--	--
APR 18...	3	0	0	0	0	20	20	4.8	.3	--	--
SEP 09...	0	0	0	0	0	60	0	7.7	.4	.00	0

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)
DEC												
06...	0930	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAY												
06...	1300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

DATE	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
DEC												
06...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MAY												
06...	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV							
09...	1130	35	125	.240	.320	.640	.000
FEB							
05...	1300	25	536	.240	.390	.280	.000
SEP							
09...	1330	34	241	1.26	2.44	4.20	.920

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 20,78	MAR 12,79	MAY 18,79	JUN 19,79	JUL 13,79
TIME	1330	1200	1030	1330	1000
TOTAL CELLS/ML	5600	100	1600	1700	1100
DIVERSITY: DIVISION	0.6	0.6	1.1	0.9	1.4
.CLASS	0.6	0.6	1.1	0.9	1.7
..ORDER	0.9	0.6	1.6	1.8	2.1
...FAMILY	0.9	1.7	2.5	1.8	2.7
....GENUS	1.0	1.7	2.5	1.8	3.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	*	0	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	15	14	--	-	--	-	36	3
....CHLORELLA	--	-	--	-	--	-	--	-	230#	21
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	87	2	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	13	1	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	320#	29
....SCENEDESMUS	--	-	--	-	160	10	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	52	3	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	--	-
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	460#	28	24	2
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	72	1	--	-	26	2	--	-	61	6
....MELOSIRA	230	4	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-	120	11
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	15	14	--	-	--	-	24	2
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	91	6	--	-	--	-
....SYNEDRA	*	0	58#	57	--	-	--	-	73	7
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	15	14	--	-	--	-	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....ENTOMONEIS	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	13	1	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	39	2	--	-	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	320	6	--	-	52	3	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	130	12
....UROGLENA	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 20,78 1330		MAR 12,79 1200		MAY 18,79 1030		JUN 19,79 1330		JUL 13,79 1000	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	24	2
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	180	11	700#	42	--	-
....GOMPHOSPHAERIA	4800#	85	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	450#	28	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	120	2	--	-	580#	36	450#	27	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	24	2
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	13	1	--	-	24	2
...PERIDINIACEAE										
....PERIDINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 10,79	SEP 14,79	NOV 9,79	MAR 14,80	MAY 6,80
TIME	0930	1000	1130	0930	1300
TOTAL CELLS/ML	570	14000	2200	1000	4400
DIVERSITY: DIVISION	0.8	0.5	0.6	1.1	1.6
.CLASS	0.8	0.5	0.6	1.5	2.0
..ORDER	1.2	0.0	0.6	2.0	2.5
...FAMILY	1.8	0.0	0.7	2.3	3.0
....GENUS	2.0	0.0	0.7	2.3	3.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	*	0	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	*	0	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	*	0	--	-	7	1	83	2
....CHLORELLA	--	-	--	-	--	-	41	4	--	-
....DICTYOSPHAERIUM	--	-	180	1	--	-	--	-	180	4
....OOCYSTIS	100#	18	*	0	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	55	1
...SCENEDESMACEAE										
....CRUCIGENIA	310#	55	--	-	--	-	--	-	--	-
....SCENEDESMUS	26	5	*	0	78	4	41	4	97	2
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	14	1	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	39	7	*	0	--	-	--	-	28	1
...VOLVOCACEAE										
....GONIUM	--	-	--	-	--	-	--	-	--	-
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....COSMARIUM	--	-	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	140	1	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	13	2	210	1	26	1	500#	49	1100#	26
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	28	1
....COCCONEIS	--	-	*	0	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	7	1	*	0
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	7	1	*	0
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	100	5	--	-	--	-
....FRAGILARIA	--	-	--	-	13	1	--	-	--	-
....SYNEDRA	13	2	*	0	--	-	120	12	470	11
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	14	1	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	28	1
...NAVICULACEAE										
....ENTOMONEIS	--	-	--	-	--	-	--	-	*	0
....NAVICULA	--	-	*	0	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	*	0	13	1	--	-	41	1
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	*	0
...TABELLARIACEAE										
....TABELLARIA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	*	0	--	-	75	7	500	11
....UROGLENA	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 10,79 0930		SEP 14,79 1000		NOV 9,79 1130		MAR 14,80 0930		MAY 6,80 1300	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	*	0	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	*	0	--	-	--	-	260	6
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	170	1	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	65	11	12000#	88	--	-	--	-	55	1
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	1900#	89	--	-	920#	21
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	710	5	--	-	200#	19	500	11
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....PHACUS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-
...PERIDINIACEAE										
....PERIDINIUM	--	-	*	0	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 4,80	JUL 8,80	AUG 6,80	SEP 9,80
TIME	1130	1400	1000	1330
TOTAL CELLS/ML	2900	970	1300	1100
DIVERSITY: DIVISION	0.9	0.8	1.4	1.7
.CLASS	0.9	0.8	1.8	1.7
..ORDER	1.7	1.2	2.3	1.9
...FAMILY	1.9	1.4	2.4	2.1
....GENUS	2.1	1.4	2.4	2.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	540#	18	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	34	1	--	-	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	26	3	26	2	65	6
....TETRAEDRON	--	-	--	-	13	1	13	1
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	67	2	26	3	51	4	52	5
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	--	-	--	-	13	1
...VOLVOCACEAE								
....GONIUM	--	-	--	-	210#	16	--	-
....PANDORINA	270	9	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....COSMARIUM	--	-	--	-	--	-	--	-
....STAURASTRUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	1700#	58	750#	77	64	5	260#	23
....MELOSIRA	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	13	1	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	130	5	--	-	51	4	--	-
....FRAGILARIA	50	2	--	-	--	-	--	-
....SYNEDRA	84	3	--	-	--	-	13	1
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....ENTOMONEIS	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	--	-	13	1
...NITZSCHIACEAE								
....NITZSCHIA	100	3	13	1	13	1	--	-
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	52	5	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....UROGLENA	--	-	--	-	620#	48	--	-
.XANTHOPHYCEAE								
..HETEROCOCCALES								
...CHLOROTHECIACEAE								
....OPHIOCYTIUM	--	-	--	-	13	1	--	-

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 4,80		JUL 8,80		AUG 6,80		SEP 9,80	
TIME	1130		1400		1000		1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	39	4	--	-	78	7
...CRYPTOMONADACEAE								
....CRYPTOMONAS	17	1	13	1	--	-	26	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	39	4	64	5	580#	52
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
....APHANIZOMENON	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	180	14	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....PHACUS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	--	-	--	-
...PERIDINIACEAE								
....PERIDINIUM	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	317	304	313	305	295	301	---	---	---	289	286	288
2	316	303	312	306	301	304	---	---	---	290	288	289
3	315	308	312	305	299	302	---	---	---	294	288	290
4	313	297	308	305	301	303	---	---	---	294	289	291
5	314	297	309	305	298	302	---	---	---	294	288	292
6	312	305	310	305	299	302	---	---	---	294	289	292
7	311	306	310	305	303	305	302	291	297	290	286	288
8	311	305	309	305	301	303	303	297	300	292	287	288
9	308	300	306	---	---	---	302	291	296	316	314	315
10	307	299	304	---	---	---	297	282	292	---	---	---
11	306	292	300	---	---	---	302	280	286	---	---	---
12	304	288	296	---	---	---	306	299	304	---	---	---
13	304	294	300	---	---	---	305	302	303	---	---	---
14	304	296	301	---	---	---	305	300	303	---	---	---
15	306	295	301	---	---	---	304	300	302	---	---	---
16	308	297	304	---	---	---	305	303	304	---	---	---
17	306	297	303	---	---	---	306	303	304	---	---	---
18	318	296	302	---	---	---	304	300	302	---	---	---
19	304	279	290	---	---	---	300	290	296	---	---	---
20	288	264	275	---	---	---	300	291	295	---	---	---
21	294	267	274	---	---	---	300	295	297	---	---	---
22	297	264	281	---	---	---	296	290	292	---	---	---
23	298	279	290	---	---	---	291	277	285	---	---	---
24	304	298	301	---	---	---	287	273	279	---	---	---
25	306	302	305	---	---	---	294	284	288	---	---	---
26	306	302	304	---	---	---	294	290	293	---	---	---
27	305	292	299	---	---	---	293	288	290	---	---	---
28	336	287	299	---	---	---	292	285	288	---	---	---
29	299	290	294	---	---	---	292	285	289	---	---	---
30	302	282	294	---	---	---	293	284	290	---	---	---
31	302	289	296	---	---	---	293	284	289	---	---	---
MONTH	336	264	300									

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	332	330	331						
2	---	---	---	334	328	331						
3	---	---	---	334	327	329						
4	---	---	---	332	327	329						
5	---	---	---	334	329	331						
6	---	---	---	334	324	330						
7	---	---	---	332	327	329						
8	329	320	324	334	326	330						
9	330	319	326	334	327	330						
10	330	321	326	331	324	328						
11	327	321	323	331	330	330						
12	327	323	326	331	320	329						
13	327	323	326	---	---	---						
14	329	324	327	---	---	---						
15	329	324	328	---	---	---						
16	331	328	329	---	---	---						
17	331	326	329	---	---	---						
18	329	327	328	---	---	---						
19	329	327	327	---	---	---						
20	327	322	326	---	---	---						
21	329	324	328	---	---	---						
22	330	329	329	---	---	---						
23	330	327	329	---	---	---						
24	329	327	328	---	---	---						
25	332	328	330	---	---	---						
26	334	327	330	---	---	---						
27	329	326	327	---	---	---						
28	331	329	330	---	---	---						
29	332	322	330	---	---	---						
30	---	---	---	---	---	---						
31	---	---	---	---	---	---						
MONTH												

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	302	297	300	---	---	---	290	278	286
2	---	---	---	301	294	298	---	---	---	288	273	284
3	---	---	---	301	295	298	---	---	---	289	273	283
4	---	---	---	300	293	297	---	---	---	288	275	284
5	311	302	310	300	293	298	---	---	---	287	278	284
6	311	307	309	298	291	296	---	---	---	292	269	283
7	312	307	311	299	293	297	302	290	296	289	270	282
8	315	307	309	---	---	---	302	292	297	290	270	283
9	310	308	309	---	---	---	301	293	298	285	271	280
10	307	304	306	---	---	---	301	286	295	290	273	282
11	307	303	305	---	---	---	299	285	294	285	270	281
12	306	303	305	---	---	---	298	287	294	288	281	285
13	306	301	305	---	---	---	297	281	293	285	275	280
14	308	303	306	---	---	---	297	280	290	285	276	282
15	306	300	304	---	---	---	296	284	291	287	278	284
16	306	299	303	---	---	---	295	284	290	284	273	280
17	302	297	300	---	---	---	294	280	288	283	274	281
18	304	300	302	---	---	---	294	282	290	283	265	275
19	303	297	301	---	---	---	294	282	289	282	275	279
20	302	294	297	---	---	---	301	282	290	284	268	279
21	302	296	299	---	---	---	295	278	289	---	---	---
22	301	295	298	---	---	---	299	277	288	---	---	---
23	302	297	300	---	---	---	297	282	290	---	---	---
24	303	297	300	---	---	---	292	275	286	---	---	---
25	304	298	301	---	---	---	291	275	286	---	---	---
26	303	296	300	---	---	---	290	280	287	---	---	---
27	301	295	299	---	---	---	290	280	286	---	---	---
28	299	296	298	---	---	---	292	281	288	---	---	---
29	301	293	298	---	---	---	294	274	288	---	---	---
30	301	295	298	---	---	---	289	272	284	---	---	---
31	---	---	---	---	---	---	288	276	285	---	---	---
MONTH												

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	16.0	17.5	9.0	8.5	8.5	---	---	---	1.0	.5	.5
2	18.5	17.0	17.5	8.5	7.5	8.0	---	---	---	.5	.0	.5
3	17.5	17.0	17.0	8.0	7.5	7.5	---	---	---	.5	.0	.0
4	17.5	16.0	17.0	8.0	7.5	7.5	---	---	---	.5	.0	.0
5	17.0	15.5	16.5	8.0	7.5	7.5	---	---	---	.5	.0	.0
6	15.5	14.0	15.5	7.5	7.0	7.5	---	---	---	.5	.0	.0
7	14.5	13.0	14.0	7.0	6.0	7.0	1.0	.0	1.0	.5	.0	.0
8	14.0	12.5	13.0	6.5	5.0	5.5	.5	.0	.5	.5	.0	.0
9	13.0	11.5	12.5	---	---	---	.0	.0	.0	.0	.0	.0
10	13.0	11.0	11.5	---	---	---	.0	.0	.0	---	---	---
11	11.5	10.0	11.0	---	---	---	.5	.0	.0	---	---	---
12	11.0	10.0	10.0	---	---	---	.0	.0	.0	---	---	---
13	10.0	9.0	9.5	---	---	---	.0	.0	.0	---	---	---
14	9.5	9.0	9.0	---	---	---	.0	.0	.0	---	---	---
15	11.0	8.5	9.5	---	---	---	.0	.0	.0	---	---	---
16	11.0	8.0	9.5	---	---	---	.0	.0	.0	---	---	---
17	11.5	9.5	10.0	---	---	---	.0	.0	.0	---	---	---
18	10.0	8.0	9.5	---	---	---	.0	.0	.0	---	---	---
19	11.0	9.5	10.0	---	---	---	.0	.0	.0	---	---	---
20	12.5	10.0	11.5	---	---	---	.0	.0	.0	---	---	---
21	13.5	12.5	13.0	---	---	---	.0	.0	.0	---	---	---
22	14.5	12.5	13.0	---	---	---	.0	.0	.0	---	---	---
23	14.0	13.0	13.5	---	---	---	.5	.0	.0	---	---	---
24	13.0	10.5	11.5	---	---	---	.0	.0	.0	---	---	---
25	10.0	9.5	10.0	---	---	---	.5	.0	.0	---	---	---
26	9.5	9.0	9.0	---	---	---	.5	.0	.0	---	---	---
27	9.0	8.5	8.5	---	---	---	.5	.0	.5	---	---	---
28	8.5	7.5	8.0	---	---	---	.5	.0	.5	---	---	---
29	8.0	7.5	8.0	---	---	---	.5	.0	.5	---	---	---
30	9.0	7.5	8.0	---	---	---	1.0	.0	.5	---	---	---
31	9.5	7.5	8.0	---	---	---	1.0	.0	.5	---	---	---
MONTH	18.5	7.5	11.5									

04132052 CHEBOYGAN RIVER AT CHEBOYGAN, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	---	---	---	.0	.0	.0						
2	---	---	---	.0	.0	.0						
3	---	---	---	.5	.0	.0						
4	---	---	---	.5	.0	.0						
5	---	---	---	.5	.0	.0						
6	---	---	---	.0	.0	.0						
7	---	---	---	.5	.0	.0						
8	.0	.0	.0	.5	.0	.0						
9	.0	.0	.0	.5	.0	.0						
10	.0	.0	.0	.5	.0	.0						
11	.5	.0	.0	.5	.0	.0						
12	.5	.0	.0	.5	.0	.0						
13	.5	.0	.0	---	---	---						
14	.5	.0	.0	---	---	---						
15	.5	.0	.0	---	---	---						
16	.5	.0	.0	---	---	---						
17	.5	.0	.0	---	---	---						
18	.5	.0	.0	---	---	---						
19	.5	.0	.5	---	---	---						
20	1.0	.5	.5	---	---	---						
21	.5	.0	.5	---	---	---						
22	.5	.0	.5	---	---	---						
23	1.0	.5	.5	---	---	---						
24	1.0	.0	.5	---	---	---						
25	.5	.0	.0	---	---	---						
26	.0	.0	.0	---	---	---						
27	.0	.0	.0	---	---	---						
28	.0	.0	.0	---	---	---						
29	.0	.0	.0	---	---	---						
30	---	---	---	---	---	---						
31	---	---	---	---	---	---						

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	---	---	---	19.5	18.0	18.5	---	---	---	22.5	22.0	22.0
2	---	---	---	19.5	18.0	18.5	---	---	---	22.5	21.5	22.0
3	---	---	---	21.5	18.0	19.5	---	---	---	22.5	21.0	22.0
4	---	---	---	21.5	18.5	20.0	---	---	---	22.5	21.0	21.5
5	17.0	15.0	16.0	21.5	19.5	20.5	---	---	---	22.5	20.5	21.5
6	17.5	15.5	16.5	22.0	19.5	20.5	---	---	---	22.0	20.5	21.5
7	17.0	15.5	16.5	22.5	20.5	21.5	25.0	23.5	24.5	22.5	20.0	21.0
8	16.0	15.0	15.0	---	---	---	26.0	24.5	25.0	22.5	21.0	21.5
9	15.0	13.5	14.0	---	---	---	25.5	24.0	24.5	22.0	21.5	21.5
10	13.5	12.5	13.0	---	---	---	25.0	23.5	24.5	21.5	19.5	20.5
11	15.0	12.0	13.5	---	---	---	24.5	23.5	24.0	21.0	19.5	20.0
12	17.0	13.5	15.0	---	---	---	24.0	23.0	24.0	19.5	19.0	19.5
13	18.5	15.0	16.0	---	---	---	22.5	22.0	22.0	19.0	18.5	19.0
14	17.5	15.5	16.5	---	---	---	23.5	22.0	22.5	18.5	17.0	18.0
15	17.5	15.5	16.5	---	---	---	23.0	21.5	22.0	18.5	17.0	17.5
16	18.0	15.0	16.5	---	---	---	22.5	20.5	21.5	17.5	16.5	17.0
17	18.5	15.0	17.0	---	---	---	22.0	21.0	21.5	17.5	15.5	16.5
18	17.5	15.0	16.5	---	---	---	22.5	21.0	21.5	16.0	15.0	15.5
19	17.0	15.5	16.0	---	---	---	23.0	21.0	21.5	16.0	15.0	15.5
20	18.5	15.5	17.0	---	---	---	23.5	21.5	22.5	16.0	15.0	15.5
21	19.0	15.5	17.5	---	---	---	24.0	22.5	23.5	---	---	---
22	19.0	17.0	18.5	---	---	---	24.0	22.5	23.5	---	---	---
23	21.5	18.0	19.0	---	---	---	24.0	22.0	23.0	---	---	---
24	21.5	18.5	20.0	---	---	---	24.0	22.5	23.0	---	---	---
25	24.0	19.5	22.0	---	---	---	24.0	22.5	23.5	---	---	---
26	24.0	21.0	22.5	---	---	---	24.0	23.0	23.5	---	---	---
27	22.5	21.0	21.5	---	---	---	23.0	22.0	22.5	---	---	---
28	22.0	21.0	21.5	---	---	---	22.0	21.5	22.0	---	---	---
29	21.0	19.0	20.0	---	---	---	22.5	21.5	22.0	---	---	---
30	21.5	18.5	20.0	---	---	---	22.5	21.0	22.0	---	---	---
31	---	---	---	---	---	---	22.5	21.5	22.0	---	---	---

04133500 THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION.--Lat 45°07'28", long 83°38'50", in NW¼ SE¼ sec.36, T.32 N., R.6 E., Alpena County, Hydrologic Unit 04070006, on left bank 0.7 mi (1.1 km) upstream from Orchard Hill Bridge, 3.8 mi (6.1 km) upstream from North Branch, 4.7 mi (7.6 km) southwest of Bolton, and 11.0 mi (17.7 km) northwest of Alpena.

DRAINAGE AREA.--588 mi^2 (1,520 km^2).

PERIOD OF RECORD.--March 1945 to September 1980 (discontinued).

REVISED RECORDS.--WSP 1437: 1946. WSP 1727: 1947(M).

GAGE.--Water-stage recorder. Datum of gage is 671.96 ft (204.813 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 12, 1945, nonrecording gage at site 500 ft (152 m) downstream at different datum.

REMARKS.--Records good except those for the winter period, which are fair. Regulation by Fletcher Pond on the Upper South Branch Thunder Bay River (usable capacity, 40,170 acre-ft or 49.5 hm^3). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 466 ft^3/s (13.20 m^3/s).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,290 ft^3/s (121 m^3/s) Mar. 26, 1976, gage height, 10.29 ft (3.136 m); maximum gage height, 10.49 ft (3.197 m) Mar. 25, 1976, backwater from ice; minimum, 92 ft^3/s (2.61 m^3/s) Sept. 28, 29, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,090 ft^3/s (59.2 m^3/s) Apr. 9, gage height, 7.35 ft (2.240 m); minimum, 220 ft^3/s (6.23 m^3/s) Aug. 27, gage height, 3.18 ft (0.969 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	265	327	360	404	375	370	487	707	383	366	283	307
2	269	322	380	393	370	370	467	630	380	353	275	336
3	246	314	390	373	370	370	468	570	372	339	266	343
4	347	306	400	375	365	370	552	520	363	321	263	317
5	308	301	400	375	365	370	618	500	350	306	270	288
6	298	299	390	375	370	370	760	490	361	296	247	270
7	299	297	382	380	370	370	1360	480	448	289	272	261
8	319	300	385	380	370	370	1890	468	504	287	271	254
9	328	301	390	380	370	370	2040	447	498	285	263	261
10	341	297	390	385	370	370	1750	424	469	280	252	261
11	325	299	375	395	370	370	1420	413	429	278	250	267
12	311	299	365	405	370	370	1180	395	397	270	257	258
13	309	295	370	415	370	370	1030	393	367	270	261	255
14	309	296	370	430	370	370	1050	430	354	270	259	262
15	309	300	365	440	370	370	1100	456	354	268	257	269
16	296	304	365	460	370	370	1070	442	373	271	250	271
17	294	308	361	470	370	370	960	405	366	269	249	289
18	306	303	370	475	370	370	937	444	344	272	247	343
19	307	301	375	470	370	370	963	562	358	269	248	360
20	318	303	385	460	370	370	953	645	493	279	245	340
21	331	307	395	450	370	370	838	553	670	295	240	286
22	322	317	410	445	370	370	728	493	614	335	244	268
23	328	352	444	440	370	375	641	443	494	307	240	266
24	353	384	486	430	370	375	585	405	408	309	241	271
25	367	376	572	425	370	380	555	372	374	290	244	260
26	358	395	629	415	370	400	555	345	347	286	229	251
27	337	454	581	405	370	420	641	330	326	316	222	251
28	334	511	516	400	370	470	813	366	327	345	223	248
29	342	463	472	390	370	504	877	366	361	340	228	243
30	340	400	446	385	---	486	806	379	385	316	255	239
31	327	---	423	380	---	495	---	390	---	302	285	---
TOTAL	9843	10031	12942	12805	10725	12045	28094	14263	12269	9279	7836	8395
MEAN	318	334	417	413	370	389	936	460	409	299	253	280
MAX	367	511	629	475	375	504	2040	707	670	366	285	360
MIN	246	295	360	373	365	370	467	330	326	268	222	239

CAL YR 1979 TOTAL 192506 MEAN 527 MAX 2010 MIN 246
WTR YR 1980 TOTAL 148527 MEAN 406 MAX 2040 MIN 222

04134000 NORTH BRANCH THUNDER BAY RIVER NEAR BOLTON, MI

LOCATION.--Lat 45°08'30", long 83°36'21", in SE¼ NW¼ sec.29, T.32 N., R.7 E., Alpena County, Hydrologic Unit 04070006, on left bank 1.5 mi (2.4 km) upstream from mouth, 2.5 mi (4.0 km) south of Bolton, and 10.3 mi (16.6 km) northwest of Alpena.

DRAINAGE AREA.--184 mi^2 (477 km^2).

PERIOD OF RECORD.--March 1945 to September 1980 (discontinued).

GAGE.--Water-stage recorder. Datum of gage is 675.52 ft (205.898 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 16, 1945, nonrecording gage at site 0.5 mi (0.8 km) upstream at different datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, May 16 to July 9, which are poor. Occasional regulation during low flows by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--35 years, 118 ft^3/s (3.342 m^3/s), 8.71 in/yr (221 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,950 ft^3/s (83.5 m^3/s) Mar. 28, 1976, gage height, 7.46 ft (2.274 m); maximum gage height, 7.98 ft (2.432 m) Mar. 31, 1950, backwater from ice; minimum discharge, 0.40 ft^3/s (0.011 m^3/s) Oct. 14, 1955.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,770 ft^3/s (50.1 m^3/s) Apr. 11, gage height, 6.32 ft (1.926 m), only peak above base of 500 ft^3/s (14.2 m^3/s); minimum, 2.8 ft^3/s (0.079 m^3/s) Aug. 25-27, gage height, 2.45 ft (0.747 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.3	40	76	150	49	27	266	315	96	24	20	7.1
2	4.7	39	71	120	47	27	261	373	90	22	17	18
3	5.2	37	64	101	45	27	278	371	88	21	15	23
4	5.6	38	59	100	43	27	265	328	84	20	12	29
5	5.6	39	58	95	42	27	252	284	80	19	11	26
6	5.8	37	56	88	41	27	255	248	78	18	9.3	23
7	8.0	35	56	80	39	27	275	214	83	17	14	20
8	9.1	33	56	74	38	27	361	185	90	17	13	18
9	11	32	59	68	36	27	651	158	96	16	10	17
10	13	32	58	65	35	27	1380	139	89	15	9.7	15
11	15	32	52	63	34	27	1630	125	80	14	10	14
12	16	33	52	61	33	27	1210	112	74	13	10	16
13	24	32	53	60	32	27	929	107	67	11	9.5	18
14	29	32	56	60	31	27	756	106	61	10	8.5	19
15	32	32	60	60	30	27	648	103	57	11	8.0	19
16	34	32	64	59	29	28	603	103	56	10	7.5	18
17	32	31	69	59	28	29	586	102	58	10	7.0	21
18	30	32	72	59	28	31	610	100	60	9.8	6.5	22
19	28	32	74	60	28	33	582	110	57	9.1	6.1	26
20	27	32	69	60	28	35	568	165	54	10	8.4	30
21	27	33	66	60	27	38	552	160	56	12	7.3	29
22	30	36	62	60	27	43	517	150	75	14	5.7	28
23	38	39	65	60	27	50	471	135	66	17	4.5	25
24	44	43	79	59	27	58	400	125	54	18	3.5	23
25	36	48	112	59	27	68	336	115	46	17	2.8	23
26	29	57	148	58	27	80	293	105	35	17	2.8	22
27	31	65	193	56	27	100	264	97	27	17	3.0	20
28	49	78	243	54	27	115	243	98	22	17	3.2	18
29	45	88	242	53	27	145	254	98	23	17	3.5	17
30	40	90	210	52	---	240	276	99	26	20	4.1	17
31	40	---	165	50	---	295	---	98	---	20	4.7	---
TOTAL	749.3	1259	2819	2163	959	1793	15972	5028	1928	482.9	257.6	621.1
MEAN	24.2	42.0	90.9	69.8	33.1	57.8	532	162	64.3	15.6	8.31	20.7
MAX	49	90	243	150	49	295	1630	373	96	24	20	30
MIN	4.7	31	52	50	27	27	243	97	22	9.1	2.8	7.1
CFSM	.13	.23	.49	.38	.18	.31	2.89	.88	.35	.09	.05	.11
IN.	.15	.25	.57	.44	.19	.36	3.23	1.02	.39	.10	.05	.13

CAL YR 1979 TOTAL 59771.2 MEAN 164 MAX 1360 MIN 3.8 CFSM .89 IN 12.08
WTR YR 1980 TOTAL 34031.9 MEAN 93.0 MAX 1630 MIN 2.8 CFSM .51 IN 6.88

04135000 THUNDER BAY RIVER NEAR ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°05'39", long 83°29'59", in SW¼ SE¼ sec.7, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, on left bank 1,000 ft (305 m) downstream from Alpena Power Company Fourmile Dam, 2.5 mi (4.0 km) upstream from Bagley Street in Alpena and 6.0 mi (9.7 km) upstream from mouth.

DRAINAGE AREA.--1,238 mi² (3,206 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional measurements made water years 1945-50. October 1979 to September 1980.

GAGE.--Two water-stage recorders. Altitude of gage on main (north) channel and secondary gage on (south) channel is 615 ft (187 m), from topographic map.

REMARKS.--Water-discharge records fair. Flow regulated at all stages by hydroelectric plant 1,000 ft (305 m) above station.

COOPERATION.--Prior to Aug. 13, gage-height record at different datum was furnished by Alpena Power Co.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 1,760 ft³/s (49.8 m³/s) Apr. 9-12, 17, May 2, 3; minimum daily, 42 ft³/s (1.19 m³/s) June 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	443	782	936	1210	726	193	1230	1750	174	625	565	208
2	452	750	936	1050	292	168	1200	1760	655	804	65	754
3	490	214	747	808	366	625	1100	1760	566	838	374	686
4	471	226	813	631	832	620	1130	1750	600	433	802	661
5	709	761	1030	313	667	765	1150	1750	669	423	501	619
6	456	544	821	480	624	554	1030	1160	666	264	510	50
7	187	587	970	666	705	602	1210	1180	503	578	595	279
8	680	653	346	637	797	401	1230	969	737	557	653	558
9	597	560	848	667	376	314	1760	732	898	526	74	569
10	572	118	693	632	273	627	1760	415	1140	558	328	664
11	574	178	842	761	793	706	1760	493	765	620	714	490
12	588	738	826	539	608	639	1760	810	676	113	565	464
13	176	686	985	482	679	672	1750	729	618	295	534	52
14	425	670	770	875	701	572	1750	799	42	569	489	102
15	680	325	443	732	721	462	1750	784	649	618	357	496
16	541	566	716	856	490	108	1750	789	1000	574	82	557
17	584	266	545	855	308	694	1760	375	666	542	78	640
18	595	352	342	1040	834	706	1750	604	596	564	385	596
19	561	773	537	957	680	678	1750	1130	677	53	312	698
20	60	602	897	964	533	1220	1750	1180	1030	311	315	50
21	763	456	981	1050	658	1230	1750	1120	601	694	340	360
22	566	419	914	907	682	1230	1750	1060	1170	552	328	811
23	696	1030	948	1110	387	1130	1740	1040	762	654	62	643
24	702	452	1060	838	398	1130	1740	728	934	595	64	549
25	649	492	1220	812	758	1100	1210	420	976	557	333	560
26	630	1070	1220	302	724	965	1200	387	846	467	173	563
27	371	868	1220	421	702	930	1200	730	713	448	186	92
28	585	1190	1220	858	673	860	1200	514	430	669	269	101
29	658	1130	1220	760	435	790	1200	560	431	697	278	536
30	669	824	1220	750	---	917	1750	727	592	573	54	558
31	629	---	1220	705	---	1120	---	375	---	661	46	---
TOTAL	16755	18244	27536	23678	17428	22708	45070	28580	20782	16422	10511	13966
MEAN	540	608	888	764	601	733	1502	922	693	530	339	466
MAX	763	1190	1220	1210	834	1230	1760	1760	1170	838	802	811
MIN	60	118	346	302	273	108	1030	375	42	53	46	50
CFSM	.44	.49	.72	.62	.49	.59	1.21	.75	.56	.43	.27	.38
IN.	.50	.55	.83	.71	.52	.68	1.35	.86	.62	.49	.32	.42

WTR YR 1980 TOTAL 261680 MEAN 715 MAX 1760 MIN 42 CFSM .58 IN 7.86

04135000 THUNDER BAY RIVER NEAR ALPENA, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1979 to September 1980.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1979 to September 1980.
WATER TEMPERATURE: October 1979 to September 1980.

REMARKS.--Daily record based on samples collected at mid-stream 1,000 ft (305 m) upstream. Daily samples collected randomly throughout the day. Monthly samples are collected as a cross-section sample at gage. Water-discharge measurements are made at times of monthly sampling. During high flows monthly samples are collected and water-discharge measurements are made at bridge on Bagley Street, 2.5 mi (4.0 km) downstream. February 1979 to September 1979 at site 6.9 mi (11.1 km) downstream (04135020).

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 416 micromhos Mar. 29; minimum daily, 253 micromhos, Apr. 12.
WATER TEMPERATURES: Maximum daily, 25.0°C July 16, 17, Aug. 9; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
04...	0800	42	325	7.9	16.0	8.9	92	K3	K1	170	6	43
NOV												
08...	0800	459	348	8.1	5.5	11.5	93	K6	K15	190	3	52
DEC												
05...	1100	887	352	7.9	1.5	12.4	93	K75	20	190	23	52
JAN												
10...	1030	479	352	7.6	.0	12.6	86	K2	K2	200	19	55
FEB												
06...	1100	960	382	7.8	.0	--	--	<1	<1	220	12	59
MAR												
13...	0900	88	397	7.6	.0	14.2	99	K2	K8	210	7	57
APR												
17...	1100	1700	263	7.5	4.0	13.2	101	<1	K12	130	11	39
MAY												
08...	1100	1110	335	7.5	13.5	8.9	85	<1	K10	180	23	52
JUN												
03...	0815	320	355	8.0	17.0	8.9	93	K120	K6	180	3	52
JUL												
10...	0800	39	330	8.1	22.5	8.0	93	K5	31	170	4	45
AUG												
05...	0730	48	309	8.0	23.0	8.0	0	K4800	K3	170	10	45
SEP												
11...	0830	48	319	8.0	19.5	9.0	100	K10	K7	170	14	43

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
04...	14	0	4.5	.2	6	.7	200	0	160	4.0	8.5
NOV											
08...	15	0	5.7	.2	9	.9	230	0	190	2.9	8.4
DEC											
05...	14	--	5.4	.2	8	1.0	200	0	160	4.0	19
JAN											
10...	15	0	5.2	.2	8	.9	220	0	180	8.8	20
FEB											
06...	17	0	6.0	.2	6	.9	250	0	200	6.3	16
MAR											
13...	17	--	6.1	.2	6	.7	250	0	200	10	12
APR											
17...	8.9	0	3.1	.1	5	1.3	150	0	120	7.6	16
MAY											
08...	13	0	5.7	.2	6	1.1	200	0	160	9.9	15
JUN											
03...	13	--	5.3	.2	6	.7	210	0	170	3.5	9.3
JUL											
10...	15	--	6.6	.2	8	.5	200	0	160	2.6	8.4
AUG											
05...	14	0	5.2	.2	6	.5	190	0	160	3.1	11
SEP											
11...	14	0	5.0	.2	6	.7	190	0	160	3.0	7.9

04135000 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DIS-,SOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
04...	4.7	.2	10	201	184	23.1	.01	.00	.050	.000	.06
NOV											
08...	4.9	.2	10	221	211	274	.02	.02	.060	.040	.07
DEC											
05...	6.7	.2	9.6	228	207	546	.06	.06	.070	.000	.08
JAN											
10...	6.1	.2	8.9	235	220	304	.20	.12	.100	.010	.12
FEB											
06...	5.8	.2	9.3	230	238	596	.06	.06	.050	.060	.06
MAR											
13...	5.5	.2	10	240	232	57.0	.13	.10	.070	.030	.08
APR											
17...	5.4	.0	4.8	188	153	863	.16	.14	.010	.000	.01
MAY											
08...	6.1	.2	4.8	217	194	650	--	.07	.040	.050	.05
JUN											
03...	5.3	.2	6.7	232	201	200	--	.03	.080	.020	.10
JUL											
10...	4.9	.2	8.6	204	191	21.5	.00	.01	.030	.010	.04
AUG											
05...	4.8	.2	10	203	187	26.3	.01	.00	.030	.000	.04
SEP											
11...	4.7	.2	13	200	182	25.9	.01	.01	.040	.030	.05

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
04...	.25	.30	.31	1.4	.020	.06	.000	--	1	.11	100
NOV											
08...	.20	.26	.28	1.2	.020	.06	.010	5.7	4	5.0	100
DEC											
05...	.39	.46	.52	2.3	.020	.06	.010	9.5	3	7.2	100
JAN											
10...	.41	.51	.71	3.1	.010	.03	.010	--	3	3.9	100
FEB											
06...	.39	.44	.50	2.2	.020	.06	.010	5.1	6	16	100
MAR											
13...	.19	.26	.39	1.7	.010	.03	.000	4.4	2	.48	100
APR											
17...	.48	.49	.65	2.9	.020	.06	.010	--	8	37	100
MAY											
08...	.51	.55	--	--	.020	.06	.010	11	4	12	100
JUN											
03...	.50	.58	--	--	.020	.06	.010	--	4	3.5	100
JUL											
10...	.51	.54	.54	2.4	.090	.28	.080	11	4	.42	100
AUG											
05...	.08	.11	.12	.53	.020	.06	.010	6.7	2	.26	100
SEP											
11...	.24	.28	.29	1.3	.000	.00	.000	--	3	.39	100

04135000 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT 04...	0800	4	4	100	40	--	2	--	<10	--
JAN 10...	1030	1	0	100	30	0	0	20	10	0
APR 17...	1100	2	2	<50	40	--	3	40	30	0
SEP 11...	0830	1	0	100	0	2	0	10	10	10

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT 04...	2	3	2	260	10	8	1	30	2	<.5
JAN 10...	0	4	2	140	30	0	0	10	5	<.1
APR 17...	0	4	1	250	60	2	0	20	9	.1
SEP 11...	0	12	2	7100	50	11	1	610	<10	--

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT 04...	<.5	--	4	0	0	0	--	6	6.4	.4
JAN 10...	<.1	2	0	0	0	0	30	20	12	.1
APR 17...	.1	0	0	0	0	0	30	30	11	.3
SEP 11...	.7	4	0	0	0	0	--	80	--	.4

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV 08...	0800	35	--	.080	.160	.000	.000
FEB 06...	1100	27	--	.000	.000	.000	.000
JUL 10...	0800	37	78.3	1.10	1.65	7.02	1.41
SEP 11...	0830	37	--	--	--	10.6	1.41

04135000 THUNDER BAY RIVER AT ALPENA. MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA. WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 8.79		MAR 13.80		MAY 8.80		JUN 3.80		JUL 10.80		AUG 5.80	
TIME	0800		0900		1100		0815		0800		0730	
TOTAL CELLS/ML	320		730		1000		4800		350		860	
DIVERSITY: DIVISION	1.4		1.6		1.4		2.0		1.9		1.4	
.CLASS	1.4		1.9		1.4		2.1		2.2		1.4	
..ORDER	1.8		2.0		1.5		2.3		2.6		2.1	
...FAMILY	2.7		2.2		2.7		2.8		2.7		2.4	
....GENUS	2.7		2.2		2.7		3.0		3.0		2.6	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	26	8	--	-	14	1	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	20	3	57	6	--	-	--	-	--	-
...MICRACTINIACEAE												
....MICRACTINIUM	--	-	--	-	29	3	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	--	-	29	3	330	7	52	15	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	77#	22	--	-
....OOCYSTIS	--	-	--	-	--	-	74	2	--	-	26	3
....POLYEDRIOPSIS	--	-	--	-	--	-	--	-	--	-	13	1
....SELENASTRUM	52#	16	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	37	1	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-	13	1
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	77	9
....SCENEDESMUS	77#	24	10	1	86	8	330	7	--	-	52	6
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	13	4	76	10	--	-	110	2	13	4	13	1
...VOLVOCACEAE												
....PANDORINA	--	-	--	-	--	-	--	-	--	-	210#	24
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	13	4	10	1	29	3	890#	18	64#	19	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	37	1	--	-	--	-
...CYMBELLACEAE												
....CYMBELLA	--	-	5	1	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	--	-	57	6	37	1	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	100#	32	10	1	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	74	2	--	-	--	-
....SYNEDRA	--	-	5	1	72	7	37	1	--	-	13	1
...NAVICULACEAE												
....NAVICULA	--	-	--	-	14	1	--	-	13	4	--	-
...NITZSCHIACEAE												
....NITZSCHIA	13	4	--	-	43	4	37	1	13	4	13	1
...TABELLARIACEAE												
....TABELLARIA	--	-	71	10	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...CHROMULINACEAE												
....CHRYSOCOCCUS	--	-	--	-	--	-	74	2	--	-	--	-
...MALLOMONADACEAE												
....MALLOMONAS	--	-	--	-	--	-	--	-	39	11	--	-
...OCHROMONADACEAE												
....DINOBRYON	--	-	96	13	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	470#	46	1400#	30	26	7	26	3
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	30	4	130	13	370	8	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	13	4	390#	54	--	-	890#	18	39	11	39	4
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	360#	42
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	13	4	--	-	--	-	--	-	13	4	13	1
...PERIDINIACEAE												
....PERIDINIUM	--	-	--	-	--	-	37	1	--	-	--	-

04135000 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	328	---	356	360	383	383	319	332	357	307	326	319
2	314	---	359	356	393	380	319	336	358	299	321	320
3	324	360	356	358	286	388	314	339	360	295	323	318
4	329	366	356	357	394	388	308	340	335	293	325	318
5	329	258	356	365	392	399	308	346	349	290	327	319
6	331	258	365	366	398	400	302	343	351	295	314	321
7	332	360	356	367	388	408	309	350	350	287	312	320
8	331	358	365	376	388	401	309	350	349	282	308	321
9	331	356	367	377	391	401	299	336	355	272	317	321
10	321	356	371	378	388	402	280	339	351	272	307	325
11	335	356	371	380	---	406	258	344	346	342	310	339
12	339	354	369	387	394	399	253	342	348	338	307	338
13	341	348	365	390	388	391	255	344	348	342	299	338
14	336	354	357	386	---	395	264	342	357	338	307	340
15	338	354	364	390	388	394	265	345	353	326	308	339
16	340	354	368	382	386	386	275	348	356	321	309	342
17	341	361	370	382	---	384	276	350	349	328	311	340
18	341	359	375	379	378	387	279	350	355	326	314	340
19	345	354	375	382	380	374	285	352	348	316	314	340
20	348	353	377	365	378	380	296	353	351	326	317	342
21	339	354	369	380	380	365	292	352	345	321	317	345
22	342	345	370	361	383	351	292	353	349	325	314	342
23	350	349	379	377	388	286	299	352	348	325	317	350
24	349	343	370	365	381	270	309	353	348	317	307	350
25	342	354	368	373	380	266	312	351	345	316	316	351
26	342	355	366	380	388	275	316	353	345	316	310	349
27	345	353	364	371	378	270	320	---	348	306	317	351
28	342	363	360	380	376	292	326	352	343	324	314	350
29	335	345	360	372	380	416	331	355	332	318	317	355
30	351	356	363	372	---	310	333	355	326	325	317	350
31	---	---	366	382	---	318	---	353	---	327	317	---
MAX	351		379	390		416	333		360	342	327	355
MIN	314		356	356		266	253		326	272	299	318

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	7.0	3.5	.0	.0	.0	1.0	10.0	18.0	20.5	23.0	22.0
2	---	6.5	3.5	.0	.0	.0	1.5	11.0	17.0	19.5	23.0	22.0
3	---	6.5	3.0	.0	.0	.0	2.0	13.5	17.0	19.5	23.0	21.5
4	---	7.0	2.5	.0	.0	.0	2.0	14.0	17.0	20.5	23.0	21.5
5	15.0	7.0	2.5	.0	.0	.0	2.0	17.0	17.0	21.0	23.5	21.5
6	15.0	7.0	.5	.0	.0	.0	3.0	17.0	17.5	21.0	24.0	21.5
7	14.0	6.0	.0	.0	.0	.0	3.0	16.0	17.5	21.0	24.5	21.0
8	13.5	6.0	1.0	.0	.0	.0	3.5	14.5	16.5	22.0	24.5	21.0
9	12.5	5.0	.5	.0	.0	.0	3.5	12.0	16.0	22.0	25.0	21.0
10	11.5	4.5	.5	.0	.0	.0	3.5	12.0	14.0	22.5	24.0	20.5
11	10.5	4.0	.5	.0	.0	.0	3.5	12.0	14.5	23.0	24.0	20.0
12	10.0	3.5	.5	.0	.0	.0	3.5	12.0	15.0	23.0	23.5	20.0
13	9.5	3.0	.0	.0	.0	.0	3.0	13.0	16.0	23.0	23.5	19.0
14	8.5	3.0	.5	.0	.0	.0	3.0	12.5	17.0	23.0	23.0	18.5
15	8.0	3.0	.5	.0	.0	.0	3.0	12.5	17.0	24.0	22.5	17.5
16	8.0	3.0	---	.0	.0	.0	2.0	13.0	17.0	25.0	22.0	17.5
17	7.5	4.0	.5	.0	.0	.0	2.5	13.5	17.5	25.0	22.0	16.5
18	8.0	4.0	.0	.0	.0	.0	3.0	14.0	17.5	24.0	21.5	16.5
19	8.5	4.0	.0	.0	.0	.0	5.0	14.0	19.0	24.5	21.5	15.5
20	9.0	5.0	.0	.0	.0	.0	8.0	14.5	17.0	24.0	22.0	15.5
21	10.0	4.5	.0	.0	.0	.0	9.0	15.0	17.5	24.5	22.5	15.5
22	10.5	5.0	1.0	.0	.0	.0	11.0	17.0	18.0	24.5	22.5	15.5
23	10.5	5.0	.0	.0	.0	.0	12.0	18.0	19.0	24.0	23.0	15.0
24	10.0	5.0	.0	.0	.0	.0	10.0	19.0	20.5	24.0	22.0	15.0
25	10.0	4.0	.0	.0	.0	.0	10.0	20.0	21.5	24.5	22.5	14.5
26	9.5	6.0	.0	.0	.0	.0	10.5	20.0	23.5	23.5	23.0	15.0
27	9.0	5.0	.0	.0	.0	.0	9.5	19.5	24.0	22.0	22.5	13.5
28	8.5	5.0	.0	.0	.0	.0	9.5	18.5	22.5	22.5	22.0	13.0
29	7.5	4.5	.0	.0	.0	.0	9.5	18.5	22.0	22.5	22.0	14.0
30	6.5	4.5	.0	.0	---	.5	9.5	18.5	21.0	22.5	24.0	13.0
31	6.5	---	.0	.0	---	.5	---	19.0	---	23.0	22.0	---
MAX		7.0		.0	.0	.5	12.0	20.0	24.0	25.0	25.0	22.0
MIN		3.0		.0	.0	.0	1.0	10.0	14.0	19.5	21.5	13.0

04135020 THUNDER BAY RIVER AT ALPENA, MI
(National stream-quality accounting network station)

LOCATION.--Lat 45°04'15", long 83°26'16", in SW¼ NW¼ sec. 22, T.31 N., R.8 E., Alpena County, Hydrologic Unit 04070006, 0.9 mi (1.4 km) upstream from mouth, on Ninth Ave. bridge in Alpena.

DRAINAGE AREA.--1,252 mi² (3,210 km²) revised.

PERIOD OF RECORD.--February to September 1979 (discontinued).

REMARKS.--Phytoplankton is for the 1979 water year.

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 13,79 1200	MAY 17,79 1045	JUN 20,79 1130	JUL 12,79 1000	AUG 9,79 1045	SEP 13,79 1030
TOTAL CELLS/ML	58	540	670	2200	220	19000
DIVERSITY: DIVISION	0.0	1.6	1.6	1.3	1.8	0.6
.CLASS	0.0	1.6	1.6	1.4	2.0	0.6
..ORDER	0.0	2.0	1.8	1.4	2.3	0.0
...FAMILY	1.5	2.2	2.2	1.9	2.9	0.0
....GENUS	2.0	2.2	2.2	2.0	3.0	0.0

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-	130	1
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	52	10	13	2	97	4	26	12	*	0
....CHLORELLA	--	-	--	-	--	-	97	4	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	*	0
....TETRAEDRON	--	-	--	-	--	-	--	-	13	6	--	-
...SCENEDESMACEAE												
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-	270	1
....SCENEDESMUS	--	-	--	-	340#	50	310	14	26	12	200	1
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	--	-	13	2	13	2	19	1	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	13	2	39	6	19	1	26	12	*	0
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-	*	0
..PENNALES												
...ACHNANTHACEAE												
....COCCONEIS	14#	25	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	14#	25	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	14#	25	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....SYNEDRA	--	-	13	2	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	--	-	--	-	--	-	--	-	--	-	*	0
...NITZSCHIACEAE												
....NITZSCHIA	14#	25	--	-	13	2	--	-	26	12	--	-
...SURIRELLACEAE												
....SURIRELLA	--	-	--	-	--	-	--	-	--	-	*	0
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...MALLOMONADACEAE												
....MALLOMONAS	--	-	--	-	--	-	--	-	13	6	--	-
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	19	1	--	-	--	-

04135020 THUNDER BAY RIVER AT ALPENA, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1979
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	MAR 13,79 1200		MAY 17,79 1045		JUN 20,79 1130		JUL 12,79 1000		AUG 9,79 1045		SEP 13,79 1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-	350	2
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	120#	21	26	4	1300#	62	52#	24	*	0
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	52	10	26	4	97	4	26	12	1000	5
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....ANACYSTIS	--	-	26	5	--	-	--	-	13	6	17000#	88
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	52	8	--	-	--	-	100	1
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	260#	48	160#	23	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	97	4	--	-	--	-
....PHACUS	--	-	--	-	--	-	39	2	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	39	2	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04135500 AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°39'35", long 84°42'45", in SE¼ SE¼ sec.7, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank 65 ft (20 m) upstream from bridge on Interstate Highway 75 (Business Loop) in Grayling, 0.7 mi (1.1 km) upstream from East Branch, and 114 mi (183 km) upstream from mouth.

DRAINAGE AREA.--110 mi² (285 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1942 to current year. Monthly discharge only for some periods, published in WSP 1307. Prior to October 1954, published as Middle Branch Au Sable River at Grayling.

GAGE.--Water-stage recorder above steel-crested dam. Datum of gage is 1,123.49 ft (342.440 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Prior to Dec. 31, 1952, diurnal fluctuation caused by powerplant 2.5 mi (4.0 km) above station.

AVERAGE DISCHARGE.--38 years, 74.8 ft³/s (2.118 m³/s), 9.23 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 274 ft³/s (7.76 m³/s) June 2, 1943, gage height, 3.00 ft (0.914 m); minimum, 28 ft³/s (0.79 m³/s) Apr. 21, 1946, gage height, 0.80 ft (0.244 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 180 ft³/s (5.10 m³/s) Apr. 9, gage height, 2.23 ft (0.680 m); minimum, 50 ft³/s (1.42 m³/s) Aug. 26, gage height, 1.13 ft (0.344 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	75	83	79	63	63	97	105	81	79	61	62
2	55	73	75	78	63	64	101	102	79	74	59	64
3	56	73	78	77	63	64	105	97	76	71	58	64
4	57	71	81	67	63	64	103	91	75	69	57	62
5	60	72	83	68	63	64	98	87	72	67	57	59
6	61	74	87	71	64	64	99	84	78	66	57	56
7	61	74	86	68	64	64	102	82	85	65	57	54
8	61	73	83	68	64	64	121	81	91	65	56	53
9	62	71	74	68	64	64	167	81	89	63	55	56
10	63	70	84	67	64	64	176	79	80	62	56	56
11	67	69	89	70	64	64	156	80	74	64	58	55
12	69	69	90	71	64	64	138	78	71	62	59	54
13	72	70	86	72	64	64	129	83	69	61	58	57
14	77	70	82	75	64	64	121	89	75	60	58	58
15	75	71	77	75	64	64	117	89	79	60	56	63
16	70	71	77	76	64	66	116	84	75	60	55	64
17	67	70	68	94	63	74	111	80	71	60	54	75
18	66	69	66	104	63	76	105	88	68	60	54	77
19	68	70	76	98	65	79	108	93	86	60	55	72
20	69	71	75	86	67	84	114	91	118	66	55	66
21	69	74	74	74	68	94	115	83	120	71	54	64
22	69	81	77	71	69	92	110	78	106	71	54	66
23	86	86	85	66	69	87	105	75	90	66	54	68
24	106	87	97	63	70	84	101	73	80	62	52	66
25	107	83	113	64	70	81	97	72	75	61	51	63
26	101	99	109	64	65	80	94	70	73	60	51	63
27	92	110	100	64	66	79	95	69	70	66	52	64
28	87	110	91	65	65	80	97	68	85	70	53	63
29	83	101	85	65	64	82	102	68	91	70	55	61
30	79	95	81	65	---	87	105	74	86	67	60	60
31	76	---	78	65	---	93	---	83	---	63	62	---
TOTAL	2246	2352	2590	2258	1883	2277	3405	2557	2468	2021	1733	1865
MEAN	72.5	78.4	83.5	72.8	64.9	73.5	114	82.5	82.3	65.2	55.9	62.2
MAX	107	110	113	104	70	94	176	105	120	79	62	77
MIN	55	69	66	63	63	63	94	68	68	60	51	53
CFSM	.66	.71	.76	.66	.59	.67	1.04	.75	.75	.59	.51	.57
IN.	.76	.80	.88	.76	.64	.77	1.15	.86	.83	.68	.59	.63

CAL YR 1979 TOTAL 27879 MEAN 76.4 MAX 171 MIN 45 CFSM .70 IN 9.43
WTR YR 1980 TOTAL 27655 MEAN 75.6 MAX 176 MIN 51 CFSM .69 IN 9.35

04135500 AU SABLE RIVER AT GRAYLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: March 1953 to September 1980 (discontinued).

INSTRUMENTATION.--Temperature recorder since March 1953.

REMARKS.--Interruptions in the record were due to malfunctions of the recorder.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 28.0°C July 1, 2, 1963; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 24.0°C Aug. 7-10; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1							---	---	.0	.0		
2							---	---	.0	.0		
3							---	---	.0	.0		
4							---	---	.0	.0		
5							---	---	.0	.0		
6							---	---	.0	.0		
7							---	---	.0	.0		
8							---	---	.0	.0		
9							---	---	.0	.0		
10							---	---	.0	.0		
11							---	---	.0	.0		
12							---	---	.0	.0		
13							---	---	.0	.0		
14							---	---	.0	.0		
15							---	---	.0	.0		
16							---	---	.0	.0		
17							---	---	.0	.0		
18							.0	.0	.0	.0		
19							.0	.0	.0	.0		
20							.0	.0	.0	.0		
21							.0	.0	.0	.0		
22							.0	.0	.0	.0		
23							.0	.0	.0	.0		
24							.0	.0	.0	.0		
25							.0	.0	.0	.0		
26							.0	.0	---	---		
27							.0	.0	---	---		
28							.0	.0	---	---		
29							.0	.0	---	---		
30							.0	.0	---	---		
31							.0	.0	---	---		
MONTH												

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	12.5	9.0	---	---	15.5	14.5	22.0	21.0	---	---
2	---	---	14.0	12.0	---	---	17.0	13.5	22.0	21.0	---	---
3	---	---	14.5	12.5	---	---	18.0	15.5	21.5	19.5	---	---
4	---	---	16.0	13.5	---	---	18.5	17.5	21.5	19.5	20.5	18.5
5	6.0	2.0	17.5	15.5	---	---	18.5	18.0	23.0	21.0	20.0	18.0
6	6.0	5.5	17.0	14.0	---	---	18.0	16.0	23.5	21.5	20.0	17.5
7	6.0	6.0	14.0	10.5	---	---	17.5	16.5	24.0	22.5	19.0	16.5
8	6.0	6.0	10.5	8.5	---	---	19.0	17.0	24.0	23.0	20.5	18.0
9	6.0	6.0	8.5	8.0	---	---	19.0	17.5	24.0	23.0	20.5	19.0
10	6.0	6.0	9.5	8.0	---	---	20.0	18.5	24.0	22.5	18.5	15.5
11	6.0	6.0	13.0	9.5	---	---	21.0	19.5	22.5	20.5	17.0	15.0
12	6.0	6.0	14.0	11.5	---	---	21.0	18.5	20.5	19.0	17.0	15.5
13	6.0	5.5	14.0	11.0	---	---	20.0	18.5	20.0	18.0	15.0	14.5
14	5.5	3.0	11.0	9.5	---	---	20.0	19.5	20.5	18.0	14.5	14.0
15	3.0	2.5	13.0	10.5	---	---	21.5	20.0	20.5	18.5	14.0	12.5
16	6.0	2.5	14.5	11.5	---	---	21.5	20.0	20.5	18.0	13.5	13.0
17	6.0	5.0	14.5	13.0	---	---	20.5	19.5	20.0	19.0	13.0	12.0
18	10.0	6.0	13.0	13.0	14.0	13.0	20.0	17.5	20.5	18.0	12.5	11.0
19	11.0	9.5	15.5	12.5	14.5	11.0	21.0	17.5	21.0	19.5	12.0	10.0
20	12.5	9.5	17.0	14.5	13.0	9.5	21.0	19.0	23.0	20.5	13.0	12.0
21	12.5	10.5	---	---	14.0	9.5	20.5	19.5	23.5	22.0	13.5	13.0
22	14.0	11.5	---	---	15.0	13.5	20.0	19.0	23.5	22.0	13.0	12.5
23	14.0	11.5	---	---	16.5	15.0	20.5	19.0	23.0	20.5	---	---
24	11.5	9.5	---	---	18.5	17.0	---	---	---	---	---	---
25	10.5	8.0	---	---	19.0	18.0	---	---	---	---	---	---
26	10.5	9.5	---	---	20.0	18.5	---	---	---	---	---	---
27	9.5	9.0	---	---	20.0	17.0	---	---	---	---	---	---
28	9.0	8.5	---	---	17.0	14.0	---	---	---	---	---	---
29	8.5	8.0	---	---	15.5	15.0	---	---	---	---	---	---
30	9.0	8.0	---	---	15.5	14.0	---	---	---	---	---	---
31	---	---	---	---	---	---	22.5	20.5	---	---	---	---
MONTH												

04135600 EAST BRANCH AU SABLE RIVER AT GRAYLING, MI

LOCATION.--Lat 44°40'08", long 84°42'20", in NW¼ NW¼ sec.8, T.26 N., R.3 W., Crawford County, Hydrologic Unit 04070007, on right bank, at south boundary of Michigan Department of Natural Resources field office in Grayling (revised) and 0.4 mi (0.6 km) upstream from mouth.

DRAINAGE AREA.--76.0 mi² (196.8 km²).

PERIOD OF RECORD.--April 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 1,110 ft (338 m), from topographic map. Prior to Sept. 30, 1958, nonrecording gage at site 10 ft (3 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by Michigan Department of Natural Resources ponds above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 44.6 ft³/s (1.263 m³/s), 7.97 in/yr (202 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 207 ft³/s (5.86 m³/s) Mar. 28, 1976, gage height, 5.24 ft (1.597 m); minimum, 7.0 ft³/s (0.20 m³/s) Mar. 27, 1965, result of freezeup; minimum daily, 16 ft³/s (0.45 m³/s) Aug. 20, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 102 ft³/s (2.89 m³/s) Apr. 9, gage height, 4.10 ft (1.250 m); minimum, 20 ft³/s (0.57 m³/s) Mar. 15, gage height, 2.82 ft (0.860 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	41	42	46	35	34	52	63	46	42	33	43
2	30	41	43	46	35	33	54	60	44	40	32	42
3	31	40	50	44	35	33	55	58	43	39	32	38
4	32	40	48	35	35	32	53	55	42	37	31	35
5	33	39	48	36	35	31	52	53	40	37	31	33
6	34	39	48	37	35	31	55	51	46	37	31	31
7	35	39	47	37	34	31	58	51	48	36	31	31
8	34	39	46	38	33	31	77	50	47	35	30	30
9	35	39	37	39	33	31	100	49	44	35	30	31
10	35	39	48	41	33	31	98	48	41	34	30	32
11	36	38	46	42	34	30	84	48	40	34	35	31
12	37	38	49	43	34	31	79	47	39	34	33	31
13	41	38	44	44	34	31	78	52	37	33	32	32
14	41	38	47	44	34	31	73	54	44	32	30	38
15	39	38	44	43	34	31	76	50	44	33	30	36
16	37	38	43	44	33	33	77	48	42	32	29	35
17	35	38	32	52	33	37	73	47	39	33	29	48
18	34	38	35	52	33	37	70	56	38	33	29	44
19	37	39	38	49	34	41	70	57	61	33	28	41
20	40	55	42	47	36	47	76	52	73	39	28	39
21	39	48	42	44	37	52	73	48	64	41	28	39
22	40	48	42	43	37	48	69	46	54	38	28	41
23	51	49	49	39	37	46	67	45	49	36	27	40
24	52	46	56	37	38	44	64	43	45	34	28	37
25	49	44	61	37	34	43	61	42	43	33	28	37
26	45	71	56	37	33	43	59	41	41	34	28	37
27	43	71	53	37	34	43	61	42	40	39	28	36
28	45	62	51	37	34	43	62	42	47	37	29	35
29	44	55	49	37	34	45	66	41	46	37	32	34
30	42	52	48	36	---	48	67	44	43	35	39	34
31	41	---	47	35	---	50	---	48	---	33	39	---
TOTAL	1197	1340	1431	1278	1000	1172	2059	1531	1370	1105	948	1091
MEAN	38.6	44.7	46.2	41.2	34.5	37.8	68.6	49.4	45.7	35.6	30.6	36.4
MAX	52	71	61	52	38	52	100	63	73	42	39	48
MIN	30	38	32	35	33	30	52	41	37	32	27	30
CFSM	.51	.59	.61	.54	.45	.50	.90	.65	.60	.47	.40	.48
IN.	.59	.66	.70	.63	.49	.57	1.01	.75	.67	.54	.46	.53

CAL YR 1979 TOTAL 17462 MEAN 47.8 MAX 128 MIN 26 CFSM .63 IN 8.55
WTR YR 1980 TOTAL 15522 MEAN 42.4 MAX 100 MIN 27 CFSM .56 IN 7.60

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI

LOCATION.--Lat 44°36'53", long 84°27'20", in SE¼ SE¼ sec.29, T.26 N., R.1 W., Crawford County, Hydrologic Unit 04070007, on right bank 10 ft (3 m) upstream from Smith Bridge, 400 ft (122 m) downstream from bridge on State Highway 72, 4.6 mi (7.4 km) upstream from mouth, and 9.1 mi (14.6 km) west of Luzerne.

DRAINAGE AREA.--401 mi² (1,039 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--Occasional low-flow measurements, water years 1951-66. October 1966 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 1,070 ft (326 m), from topographic map. Apr. 19, 1951, to Nov. 14, 1966, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are poor. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--14 years, 223 ft³/s (6.315 m³/s), 7.55 in/yr (192 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,120 ft³/s (31.7 m³/s) Mar. 28, 1976, gage height, 7.30 ft (2.225 m); minimum, 99 ft³/s (2.80 m³/s) July 24, 27, 1977, gage height, 4.11 ft (1.253 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 417 ft³/s (11.8 m³/s) Apr. 10, gage height, 5.40 ft (1.646 m); maximum gage height, 5.97 ft (1.820 m) Mar. 2, backwater from ice; minimum discharge, 118 ft³/s (3.34 m³/s) Aug. 24-27, gage height, 4.22 ft (1.286 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	152	156	231	214	155	156	240	329	204	213	134	153
2	153	158	211	208	155	145	255	325	205	195	131	155
3	154	158	207	202	155	140	260	319	200	181	130	151
4	154	156	205	188	155	138	252	309	194	172	127	145
5	142	154	205	186	155	136	232	298	187	166	126	137
6	137	154	207	196	155	136	238	284	200	161	125	133
7	135	154	206	188	152	140	253	272	208	158	124	127
8	136	152	204	184	152	142	286	263	219	159	124	124
9	138	150	198	184	152	144	382	253	219	156	122	131
10	138	155	195	191	152	146	411	245	212	141	121	141
11	140	166	199	191	152	144	412	239	197	147	123	142
12	140	172	216	200	152	144	400	232	185	141	133	134
13	140	177	203	203	152	144	373	247	177	140	139	140
14	140	182	199	188	152	144	344	269	176	138	131	151
15	140	182	198	186	152	142	337	269	178	137	126	159
16	136	183	192	188	152	144	340	271	180	136	125	160
17	136	181	181	217	152	154	339	273	173	135	127	218
18	136	182	185	224	152	156	332	296	165	134	126	226
19	140	183	180	221	152	151	325	306	218	132	124	230
20	144	183	178	217	152	191	328	306	287	148	124	232
21	148	186	180	204	149	229	319	303	284	159	124	221
22	148	199	182	195	152	229	313	289	291	156	124	220
23	168	211	200	182	151	254	306	270	283	144	123	228
24	172	211	230	180	152	229	295	252	250	136	120	224
25	172	211	270	178	150	210	285	241	212	130	118	228
26	164	261	262	172	153	208	278	231	188	130	118	228
27	156	269	270	165	153	210	282	222	175	135	119	221
28	158	267	260	162	154	210	290	211	215	140	120	215
29	158	264	242	160	154	215	313	204	228	140	139	210
30	156	255	222	158	---	220	328	204	225	138	151	205
31	156	---	212	158	---	230	---	206	---	136	150	---
TOTAL	4587	5670	6514	5882	4426	5381	9348	8238	6335	4634	3948	5389
MEAN	148	189	210	190	153	174	312	266	211	149	127	180
MAX	172	269	270	224	155	254	412	329	291	213	151	232
MIN	135	150	178	158	149	136	232	204	165	130	118	124
CFSM	.37	.47	.52	.47	.38	.43	.78	.66	.53	.37	.32	.45
IN.	.43	.53	.60	.55	.41	.50	.87	.76	.59	.43	.37	.50

CAL YR 1979 TOTAL 79372 MEAN 217 MAX 627 MIN 124 CFSM .54 IN 7.36
WTR YR 1980 TOTAL 70352 MEAN 192 MAX 412 MIN 118 CFSM .48 IN 6.53

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: November 1966 to current year.

INSTRUMENTATION.--Temperature recorder since November 1966.

REMARKS.--Temperature recorder clock stopped Mar. 26 to Apr. 2 (range in temperature 1.0 to 9.0°C), May 15 to June 12 (range in temperature 10.0 to 19.0°C), July 26-31 (range in temperature 14.0 to 18.5°C).

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 24.0°C July 16, 1968, July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 22.5°C June 26-27, July 19; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	11.5	8.0	6.5	6.0	.0	.0	1.0	1.0	.0	.0	.0	.0
2	9.5	8.5	6.0	4.5	.0	.0	1.0	1.0	.0	.0	.0	.0
3	9.0	8.5	4.5	4.0	.0	.0	1.0	.0	.0	.0	.0	.0
4	8.5	7.5	4.0	4.0	1.0	.0	.0	.0	.0	.0	1.5	.0
5	8.5	7.5	4.0	4.0	1.5	.0	.0	.0	.0	.0	1.5	.0
6	8.0	7.0	4.0	4.0	1.5	1.0	.0	.0	.0	.0	.0	.0
7	7.0	6.0	4.0	3.5	1.0	1.0	.0	.0	.0	.0	1.0	.0
8	6.5	6.0	3.5	2.5	1.0	.0	.0	.0	.0	.0	2.5	.0
9	5.0	6.0	2.5	2.0	.5	.0	.0	.0	.5	.0	2.0	.0
10	6.0	4.5	2.0	2.0	1.0	.5	.0	.0	.5	.0	2.5	.5
11	4.5	4.0	2.0	1.5	2.0	1.0	.0	.0	1.0	.5	1.0	.0
12	5.0	4.0	1.5	1.0	2.0	.5	.0	.0	.5	.5	1.0	.0
13	5.0	4.0	2.0	1.5	.5	.0	.0	.0	1.0	.5	1.0	.0
14	4.5	4.0	2.0	1.5	.5	.5	1.0	.0	1.5	1.0	2.5	.5
15	6.5	4.0	2.0	2.0	.5	.5	1.0	1.0	1.0	.0	2.5	1.5
16	6.5	4.5	2.0	1.0	.5	.0	1.5	1.0	.0	.0	3.0	1.5
17	7.5	6.5	2.0	1.5	.0	.0	1.5	1.5	.0	.0	3.0	1.0
18	7.0	6.5	2.0	1.5	.0	.0	1.5	1.5	.0	.0	3.0	.5
19	7.5	6.5	3.0	2.0	.0	.0	1.5	1.5	1.0	.0	4.0	2.0
20	8.5	7.5	3.0	3.0	.5	.0	1.5	1.0	1.5	1.0	4.5	3.0
21	9.5	8.5	3.0	3.0	1.0	.5	1.0	.5	2.0	2.0	3.0	1.5
22	10.5	9.5	3.5	3.0	2.0	1.5	1.0	1.0	2.0	1.0	3.0	1.0
23	10.5	7.5	3.5	3.5	2.0	2.0	1.0	.0	2.0	1.5	2.0	2.0
24	7.5	6.0	3.5	3.0	2.0	2.0	.0	.0	2.0	1.5	2.0	1.5
25	6.0	4.5	3.0	2.5	2.0	1.0	.0	.0	1.0	.5	3.5	1.5
26	4.5	4.0	3.0	3.0	1.0	1.0	.0	.0	.5	.0	---	---
27	4.0	3.5	3.0	3.0	1.0	1.0	.0	.0	1.0	.0	---	---
28	4.0	3.5	3.0	2.0	1.0	1.0	.0	.0	1.0	.0	---	---
29	4.5	4.0	2.0	1.0	1.0	.5	.0	.0	.0	.0	---	---
30	4.5	3.5	1.0	.0	.5	.5	.0	.0	---	---	---	---
31	6.0	4.5	---	---	1.0	.5	.0	.0	---	---	---	---
MONTH	11.5	3.5	6.5	.0	2.0	.0	1.5	.0	2.0	.0		

04135700 SOUTH BRANCH AU SABLE RIVER NEAR LUZERNE, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	---	---	12.0	9.0	---	---	16.5	15.0	20.5	16.5	16.5	15.5
2	---	---	13.5	10.5	---	---	18.5	14.5	19.5	17.0	16.5	15.0
3	8.0	5.5	14.0	11.0	---	---	19.5	15.0	19.0	15.5	16.5	14.5
4	5.5	5.0	15.0	12.0	---	---	20.5	16.5	20.0	16.0	17.0	14.5
5	7.5	4.5	16.5	13.0	---	---	20.5	18.0	20.5	17.5	17.5	14.5
6	7.0	6.0	15.5	13.0	---	---	19.5	15.5	20.0	17.0	17.0	14.0
7	7.0	7.0	12.5	10.5	---	---	19.0	16.0	21.0	17.5	16.5	13.5
8	7.0	7.0	10.5	9.0	---	---	21.5	18.0	21.5	18.5	16.5	14.0
9	7.0	6.5	9.5	8.5	---	---	21.0	17.0	21.0	17.5	17.0	15.0
10	6.5	5.5	10.0	8.0	---	---	21.5	17.0	20.0	17.5	15.5	12.5
11	5.5	5.0	13.0	10.0	---	---	22.0	18.0	18.0	16.5	15.0	12.5
12	5.0	4.5	14.0	10.5	---	---	21.5	17.0	17.5	16.0	14.5	13.0
13	4.5	4.5	13.0	11.0	17.5	14.0	19.5	16.0	17.5	15.5	13.5	13.0
14	4.5	4.0	11.5	10.0	17.5	15.5	20.0	17.5	18.5	15.0	13.5	13.0
15	4.5	4.0	---	---	16.0	14.0	20.5	19.0	18.5	16.0	13.0	12.0
16	6.5	4.0	---	---	16.0	11.5	21.0	18.0	18.5	15.0	13.0	12.5
17	6.5	5.5	---	---	17.0	12.5	20.5	18.5	17.0	16.0	12.5	11.5
18	9.0	5.5	---	---	17.5	14.5	19.5	17.0	18.5	15.5	12.0	10.5
19	10.5	7.5	---	---	17.0	13.0	22.5	17.5	18.5	15.5	12.0	10.0
20	11.5	9.0	---	---	15.5	11.5	22.0	18.5	19.5	16.0	12.5	12.0
21	12.0	9.0	---	---	15.5	13.0	21.0	19.5	19.5	18.0	13.5	12.5
22	13.5	10.0	---	---	17.5	14.0	21.0	19.0	20.5	17.0	13.5	13.0
23	13.5	11.0	---	---	19.5	15.5	20.5	17.5	20.0	15.5	13.0	11.5
24	11.5	9.5	---	---	20.0	17.0	21.0	16.5	19.5	16.0	12.5	10.5
25	10.5	8.0	---	---	21.0	17.5	20.5	17.0	18.0	16.5	12.0	10.5
26	10.5	9.5	---	---	22.5	19.0	---	---	18.0	16.0	10.5	9.5
27	9.5	9.0	---	---	22.5	18.0	---	---	18.0	17.0	10.0	8.5
28	9.0	8.5	---	---	18.0	15.0	---	---	17.0	16.0	9.5	8.0
29	8.5	8.5	---	---	17.0	15.5	---	---	18.5	15.5	10.5	8.5
30	9.0	8.5	---	---	16.5	15.0	---	---	18.5	16.0	11.5	10.0
31	---	---	---	---	---	---	---	---	18.0	16.5	---	---
MONTH									21.5	15.0	17.5	8.0

04136500 AU SABLE RIVER AT MIO, MI

LOCATION.--Lat 44°39'36", long 84°07'52", in NW¼ sec.7, T.26 N., R.3 E., Oscoda County, Hydrologic Unit 04070007, on right bank 150 ft (46 m) upstream from bridge on State Highway 33 in Mio, 500 ft (152 m) downstream from Mio hydroelectric plant, 9.5 mi (15.3 km) downstream from Big Creek, and 73.0 mi (117.5 km) upstream from mouth.

DRAINAGE AREA.--1,100 mi² (2,850 km²), approximately.

PERIOD OF RECORD.--July 1952 to current year.

GAGE.--Water-stage recorder. Datum of gage is 929.60 ft (283.342 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated at all stages by hydroelectric plant 500 ft (152 m) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 989 ft³/s (28.01 m³/s), 12.21 in/yr (310 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,170 ft³/s (118 m³/s) Mar. 28, 1976, gage height, 6.14 ft (1.871 m); minimum, 7.0 ft³/s (0.20 m³/s) Aug. 4, 1977, gage height, -0.09 ft (-0.027 m); minimum daily, 21 ft³/s (0.59 m³/s) Aug. 9, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,710 ft³/s (76.7 m³/s) May 19, gage height, 4.92 ft (1.500 m); minimum, 102 ft³/s (2.89 m³/s) Nov. 18, gage height, 0.80 ft (0.244 m); minimum daily, 579 ft³/s (16.4 m³/s) Mar. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	826	909	1040	959	659	579	1130	1400	965	991	798	966
2	797	909	948	990	693	670	1130	1310	943	956	799	911
3	790	893	877	951	752	859	1140	1270	958	930	773	930
4	806	893	1030	820	827	926	1200	1200	919	880	761	846
5	849	871	1020	800	849	912	1100	1180	902	878	769	785
6	825	861	945	846	819	810	1130	1170	943	864	776	772
7	814	858	994	824	829	792	1180	1120	1060	864	743	774
8	821	855	975	823	833	809	1310	1010	1060	845	731	741
9	838	833	950	804	833	810	1790	1030	1020	878	734	785
10	828	842	953	726	844	900	2220	1060	971	838	752	799
11	821	858	963	995	820	847	1920	1060	932	826	752	785
12	859	850	963	1040	814	721	1620	1020	893	817	785	779
13	878	873	1030	850	827	823	1570	1060	884	824	787	804
14	871	878	992	999	846	902	1370	1230	887	808	776	839
15	861	875	942	1030	829	879	1290	1170	1040	826	764	867
16	840	895	929	975	819	819	1330	1100	972	835	732	850
17	835	897	833	1040	791	897	1330	1050	900	844	724	1170
18	843	825	717	1100	750	955	1330	1240	898	807	734	1120
19	852	926	988	1070	844	928	1320	1500	1080	796	749	1080
20	874	920	985	1010	855	984	1490	1250	1800	880	742	963
21	868	929	937	977	835	1340	1400	1210	1510	963	739	947
22	859	998	894	951	849	1160	1430	1130	1200	903	741	974
23	962	1070	964	900	848	1000	1330	1080	1140	900	740	991
24	1060	1050	1200	784	839	1020	1240	1050	1150	859	734	988
25	1060	969	1350	847	832	993	1200	979	1020	761	715	938
26	997	1080	1170	914	754	980	1160	959	940	748	689	888
27	913	1450	1120	910	784	958	1190	940	902	865	720	903
28	938	1270	1120	836	816	944	1210	932	1060	883	729	916
29	932	1110	1090	857	671	974	1230	912	1130	861	735	902
30	912	1040	1040	886	---	1050	1320	931	1100	861	937	865
31	898	---	964	741	---	1120	---	976	---	834	1080	---
TOTAL	27127	28487	30923	28255	23361	28361	40630	34529	31151	26625	23740	26878
MEAN	875	950	998	911	806	915	1354	1114	1038	859	766	896
MAX	1060	1450	1350	1100	855	1340	2220	1500	1800	991	1080	1170
MIN	790	825	717	726	659	579	1100	912	884	748	689	741
CFSM	.80	.86	.91	.83	.73	.83	1.23	1.01	.94	.78	.70	.82
IN.	.92	.96	1.05	.96	.79	.96	1.37	1.17	1.05	.90	.80	.91

CAL YR 1979 TOTAL 384628 MEAN 1054 MAX 2490 MIN 624 CFSM .96 IN 13.01

WTR YR 1980 TOTAL 350067 MEAN 956 MAX 2220 MIN 579 CFSM .87 IN 11.84

04137500 AU SABLE RIVER NEAR AU SABLE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°26'09", long 83°26'28", in NE¼ NW¼ sec.35, T.24 N., R.8 E., Iosco County, Hydrologic Unit 04070007, 5.5 mi (8.8 km) northwest of Au Sable and 10.4 mi (16.7 km) upstream from mouth.

DRAINAGE AREA.--1,540 mi² (3,990 km²), approximately.

PERIOD OF RECORD.--Water years 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to current year.
WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily record based on samples collected at mid-stream of bridge .6 mi (1.0 km) downstream from Foote Dam. Daily samples collected randomly throughout the day. Monthly samples are collected as a cross-section sample at or near vicinity of bridge. Water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 346 micromhos Nov. 21, 1978; minimum daily, 229 micromhos April 19, 21, 1979.
WATER TEMPERATURES: Maximum daily, 26.0°C Aug. 12, 1980; minimum daily, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 03...	0845	1300	300	7.9	15.5	9.1	91	K2	K13	150	9	43
NOV 07...	1000	1360	275	8.1	7.5	10.6	89	K1	K3	160	8	44
DEC 04...	0930	671	296	7.9	1.5	12.3	87	<1	K1	--	--	--
JAN 09...	1000	1610	295	7.6	.0	13.0	89	<1	K3	160	2	45
FEB 07...	1330	2410	292	7.9	.0	--	--	<1	K1	170	12	49
MAR 12...	1000	2500	304	7.6	.0	14.0	96	<1	K1	160	13	46
APR 16...	1100	2600	250	7.6	3.5	13.6	101	<1	<1	130	2	38
MAY 09...	1030	2290	247	7.7	11.5	10.7	97	K1	K3	130	12	37
JUN 02...	1030	3170	270	7.8	17.0	9.1	96	260	K11	140	6	39
JUL 11...	1230	2370	274	8.0	23.0	7.6	89	K4	K14	150	5	40
AUG 04...	1030	1760	266	8.0	24.0	7.5	89	K20	24	150	9	43
SEP 12...	1100	2600	278	7.9	21.5	7.8	88	K1	K2	150	5	40

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 03...	10	0	3.8	.1	5	.5	170	0	140	3.4	8.9
NOV 07...	11	0	4.6	.2	8	.6	180	0	150	2.3	7.5
DEC 04...	--	--	--	--	--	--	190	0	160	3.8	--
JAN 09...	11	0	4.1	.1	7	.6	190	0	160	7.6	11
FEB 07...	11	0	4.6	.2	6	.7	190	0	160	3.8	12
MAR 12...	11	--	4.5	.2	6	.5	180	0	150	7.2	10
APR 16...	9.2	--	3.8	.1	6	.7	160	0	130	6.4	8.1
MAY 09...	9.5	0	4.4	.2	7	.7	150	0	120	4.7	9.7
JUN 02...	9.3	--	4.0	.2	6	.5	160	0	130	4.0	9.1
JUL 11...	11	--	5.4	.2	7	.5	170	0	140	2.7	8.2
AUG 04...	10	0	4.1	.1	6	.4	160	0	140	2.7	8.8
SEP 12...	11	0	4.2	.2	6	.4	160	0	140	3.4	7.0

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 03...	4.8	.1	8.7	175	164	614	.02	.00	.070	.000	.08
NOV 07...	4.8	.1	8.6	177	170	650	.01	.01	.030	.010	.04
DEC 04...	--	--	9.3	--	--	--	.00	.01	.020	.000	.02
JAN 09...	4.8	.1	8.8	176	180	765	.13	.10	.090	.000	.11
FEB 07...	5.3	.1	9.4	181	186	1180	.09	.09	--	.050	--
MAR 12...	5.2	.1	9.6	185	176	1250	.11	--	.010	.010	.01
APR 16...	4.7	.0	6.8	162	151	1140	.12	.13	.000	.010	.00
MAY 09...	4.4	.1	7.2	145	146	897	.10	.09	.020	.010	.02
JUN 02...	4.6	.1	6.9	170	152	1460	.02	.01	.030	.020	.04
JUL 11...	4.6	.1	8.4	173	162	1110	.00	.00	.000	.000	.00
AUG 04...	4.6	.1	8.9	176	164	836	.02	.00	.000	.000	.00
SEP 12...	4.9	.1	11	172	163	1210	.01	.01	.020	.030	.02

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 03...	.17	.24	.26	1.2	.020	.06	.000	--	2	7.0	100
NOV 07...	.18	.21	.22	.97	.010	.03	.010	3.8	6	22	100
DEC 04...	.33	.35	.35	1.6	.040	.12	.000	2.9	3	5.4	100
JAN 09...	.15	.24	.37	1.6	.010	.03	.010	--	4	17	100
FEB 07...	--	.16	.25	1.1	.010	.03	.010	2.5	2	13	100
MAR 12...	.17	.18	.29	1.3	.010	.03	.000	2.8	3	20	100
APR 16...	.28	.28	.40	1.8	.010	.03	.010	--	9	63	100
MAY 09...	.17	.19	.29	1.3	.030	.09	.020	4.4	3	19	100
JUN 02...	.25	.28	.30	1.3	.020	.06	.010	4.6	8	68	100
JUL 11...	.15	.15	.15	.66	.040	.12	.040	11	3	19	100
AUG 04...	.17	.17	.19	.84	.020	.06	.010	7.2	11	52	100
SEP 12...	.16	.18	.19	.84	.000	.00	.000	--	7	49	100

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)
OCT 03...	0845	5	3	200	40	0	3	--	10	0
JAN 09...	1000	2	2	--	30	0	0	20	20	0
APR 16...	1100	4	3	<50	30	0	2	40	30	0
SEP 12...	1100	3	2	100	0	0	0	50	20	0

DATE	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
OCT 03...	1	4	2	620	0	6	0	--	2	<.5
JAN 09...	0	3	2	130	30	1	0	20	4	.1
APR 16...	0	13	1	180	20	4	0	20	4	.2
SEP 12...	0	6	3	110	60	1	1	70	0	.3

DATE	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
OCT 03...	<.5	1	0	0	0	0	--	0	3.5	.2
JAN 09...	.1	2	0	0	0	0	--	50	9.0	.1
APR 16...	.1	3	1	0	0	0	20	20	9.5	.4
SEP 12...	.4	2	1	0	0	0	30	30	19	.3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
DEC 04...	0930	27	208	.320	.470	.720	.210

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 21,78 1530		MAR 14,79 1345		MAY 16,79 1100		JUN 21,79 1500		JUL 11,79 0730	
TOTAL CELLS/ML	820		15		450		170		1400	
DIVERSITY: DIVISION	1.1		0.0		1.2		1.3		1.3	
.CLASS	1.1		0.0		1.2		1.3		1.6	
..ORDER	1.1		0.0		1.6		1.8		1.6	
...FAMILY	1.3		0.0		2.0		2.3		1.7	
....GENUS	1.7		0.0		2.3		2.3		1.7	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	29	4	--	-	--	-	--	-	80	6
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	320#	39	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	14	2	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	--	-	53	4
....SCENEDESMUS	29	4	--	-	100#	23	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	26	6	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	400#	49	--	-	13	3	--	-	--	-
....MELOSIRA	--	-	--	-	--	-	26#	15	--	-
....STEPHANODISCUS	14	2	--	-	--	-	--	-	--	-
..PENNALES										
...DIATOMACEAE										
....DIATOMA	--	-	--	-	52	11	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	26	6	39#	23	94	6
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	190#	43	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	15#	100	--	-	13	8	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	--	-	13	8	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	450#	31
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	760#	53
...CRYPTOMONADACEAE										
....CRYPTOMONAS	14	2	--	-	39	9	65#	38	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	13	8	--	-
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 8,79		SEP 12,79		NOV 7,79		MAR 12,80		MAY 9,80	
TIME	0830		1200		1000		1000		1030	
TOTAL CELLS/ML	0		740		270		1500		170	
DIVERSITY: DIVISION	0.0		1.5		0.5		0.9		0.8	
.CLASS	0.0		1.5		0.5		0.9		0.8	
..ORDER	0.0		0.0		1.0		1.2		1.1	
...FAMILY	0.0		0.0		1.0		1.2		1.1	
....GENUS	0.0		0.0		1.3		1.4		1.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	5	1	--	-	--	-	13	8
....CHLORELLA	--	-	10	1	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	55	4	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	14	1	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	20	3	--	-	--	-	--	-
....SCENEDESMUS	--	-	20	3	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	26	10	14	1	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	--	-	10	1	13	5	--	-	13	8
....MELOSIRA	--	-	30	4	190#	71	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	50	7	39	14	--	-	52#	31
....FRAGILARIA	--	-	96	13	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	14	1	77#	46
...NAVICULACEAE										
....NAVICULA	--	-	5	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	69	5	--	-
....OCHROMONAS	--	-	--	-	--	-	120	8	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	70	9	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	50	7	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	310#	42	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	69	5	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	65	9	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	1100#	75	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..GYMNODINIALES										
...GYMNODINIACEAE										
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	--	-	13	8

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 2,80		JUL 11,80		AUG 4,80		SEP 12,80	
TIME	1030		1230		1030		1100	
TOTAL CELLS/ML	860		340		1000		640	
DIVERSITY: DIVISION	1.4		1.3		0.5		1.3	
.CLASS	1.4		1.3		0.5		1.3	
..ORDER	1.7		1.5		1.4		1.3	
...FAMILY	2.5		1.6		1.4		1.3	
....GENUS	3.0		1.7		1.4		1.3	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	13	1	13	2
...MICRACTINIACEAE								
....MICRACTINIUM	29	3	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	140#	17	--	-	13	1	--	-
....CHLORELLA	--	-	13	4	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	14	2	--	-	--	-	--	-
....TREUBARIA	--	-	13	4	--	-	--	-
....WESTELLA	--	-	--	-	--	-	52	8
...SCENEDESMACEAE								
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	170#	20	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	29	3	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	14	2	26	8	26	3	78	12
....MELOSIRA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	57	7	--	-	--	-	--	-
....FRAGILARIA	14	2	--	-	--	-	--	-
....SYNEDRA	240#	28	26	8	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	72	8	13	4	13	1	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	14	2	--	-	13	1	13	2
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	57	7	230#	69	650#	63	470#	73
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	300#	29	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	13	2
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..GYMNODINIALES								
...GYMNODINIACEAE								
....GYMNODINIUM	--	-	--	-	--	-	--	-
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	13	4	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04137500 AU SABLE RIVER NEAR AU SABLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	290	304	---	303	303	313	299	258	285	286	297	291
2	300	298	---	302	306	302	297	253	288	---	299	295
3	292	305	---	303	304	317	297	259	285	292	297	---
4	293	---	306	301	303	313	302	263	283	291	288	---
5	296	---	305	300	305	316	296	255	279	289	---	---
6	289	---	---	---	297	317	296	260	---	---	294	---
7	298	304	301	301	307	318	309	---	---	---	307	---
8	297	---	304	302	305	318	299	---	---	---	298	---
9	290	---	304	294	307	319	286	263	---	---	294	---
10	296	304	302	304	306	317	276	263	---	---	293	---
11	297	295	305	300	---	316	---	266	---	289	295	---
12	300	301	312	295	299	307	277	261	288	294	296	---
13	296	305	306	295	298	---	277	267	288	294	303	---
14	300	305	308	304	302	318	266	261	288	---	291	299
15	296	301	309	296	307	310	273	271	287	---	291	---
16	301	---	305	303	306	---	267	264	289	---	293	---
17	293	---	311	296	306	---	268	268	287	---	291	---
18	293	295	311	296	299	302	256	282	303	284	295	---
19	302	308	305	301	302	306	260	270	---	277	289	---
20	301	305	308	301	306	310	267	280	284	286	293	---
21	296	306	308	300	302	---	263	281	290	293	291	---
22	291	306	305	241	299	---	267	277	289	287	---	---
23	301	---	304	295	307	317	263	280	290	288	295	---
24	298	---	---	295	307	308	262	283	289	---	293	---
25	302	---	302	296	306	310	265	272	---	280	299	---
26	301	---	303	296	306	308	264	281	293	280	295	---
27	296	---	302	295	307	299	260	295	288	285	---	---
28	301	---	300	296	307	310	262	287	290	280	258	---
29	302	---	295	296	307	308	263	288	290	285	295	---
30	296	---	303	303	---	306	260	289	287	287	295	---
31	300	---	298	---	---	309	---	283	---	287	291	---
MAX	302											
MIN	289											

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	11.0	3.0	1.0	1.0	1.0	1.0	9.0	17.0	21.0	23.0	23.0
2	---	11.0	---	1.0	1.0	1.0	1.0	10.0	17.0	21.0	23.0	23.0
3	---	10.0	3.0	1.0	1.0	1.0	1.0	11.0	17.0	23.0	23.0	---
4	---	10.0	2.0	1.0	1.0	1.0	1.0	12.0	17.0	23.0	23.0	---
5	16.0	10.0	2.0	1.0	1.0	1.0	1.0	14.0	17.0	22.0	23.0	---
6	16.0	10.0	2.0	1.0	1.0	1.0	2.0	12.0	17.0	22.0	25.0	---
7	15.0	10.0	2.0	1.0	1.0	1.0	2.0	11.0	16.0	---	25.0	---
8	15.0	9.0	2.0	1.0	1.0	1.0	3.0	---	16.0	---	24.0	---
9	15.0	8.0	2.0	1.0	1.0	1.0	3.0	---	16.0	---	24.0	---
10	14.0	7.0	2.0	1.0	1.0	1.0	3.0	11.0	16.0	23.0	25.0	---
11	14.0	7.0	2.0	1.0	1.0	1.0	3.0	11.0	17.0	23.0	25.0	---
12	13.0	7.0	1.0	1.0	1.0	1.0	3.0	12.0	17.0	23.0	26.0	---
13	13.0	7.0	1.0	1.0	1.0	1.0	3.0	12.0	17.0	23.0	24.0	---
14	---	6.0	1.0	1.0	1.0	1.0	3.0	12.0	17.0	23.0	24.0	---
15	13.0	6.0	1.0	1.0	1.0	1.0	3.0	13.0	17.0	24.0	24.0	---
16	12.0	5.0	1.0	1.0	1.0	1.0	3.0	13.0	18.0	---	24.0	---
17	12.0	5.0	1.0	1.0	1.0	1.0	3.0	13.0	18.0	24.0	24.0	---
18	12.0	5.0	1.0	1.0	---	1.0	3.0	13.0	18.0	24.0	24.0	---
19	12.0	5.0	1.0	1.0	---	1.0	4.0	14.0	---	24.0	24.0	---
20	12.0	5.0	1.0	1.0	1.0	1.0	5.0	14.0	18.0	---	24.0	---
21	13.0	5.0	1.0	1.0	1.0	1.0	5.0	15.0	18.0	---	24.0	---
22	13.0	---	1.0	1.0	1.0	1.0	5.0	15.0	19.0	---	24.0	---
23	13.0	5.0	1.0	1.0	1.0	1.0	6.0	16.0	19.0	---	24.0	---
24	12.0	5.0	1.0	1.0	1.0	1.0	7.0	17.0	19.0	---	24.0	---
25	12.0	5.0	1.0	1.0	1.0	1.0	8.0	17.0	19.0	24.0	24.0	---
26	12.0	5.0	1.0	1.0	1.0	1.0	8.0	17.0	19.0	23.0	24.0	---
27	10.0	5.0	1.0	1.0	1.0	1.0	8.0	17.0	20.0	23.0	24.0	---
28	12.0	5.0	1.0	1.0	1.0	1.0	8.0	17.0	20.0	23.0	24.0	---
29	12.0	4.0	1.0	1.0	1.0	1.0	8.0	17.0	20.0	23.0	24.0	---
30	11.0	3.0	1.0	1.0	---	1.0	8.0	17.0	21.0	23.0	25.0	---
31	11.0	---	1.0	1.0	---	1.0	---	17.0	---	23.0	---	---
MAX				1.0		1.0	8.0				26.0	
MIN				1.0		1.0	1.0				23.0	

04138500 AU GRES RIVER NEAR NATIONAL CITY, MI

LOCATION.--Lat 44°10'26", long 83°44'36", in NE¼ NE¼ sec.31, T.21 N., R.6 E., Iosco County, Hydrologic Unit 04080101, on left bank 15 ft (5 m) upstream from highway bridge on Allen Road, 1.7 mi (2.7 km) upstream from Elm Creek, 4.4 mi (7.1 km) southwest of National City, 12.8 mi (20.6 km) southwest of Tawas City, and 13 mi (21 km) upstream from mouth.

DRAINAGE AREA.--169 mi² (438 km²).

PERIOD OF RECORD.--October 1950 to current year. Monthly discharge only October, November, 1950, published in WSP 1727.

REVISED RECORDS.--WSP 1911: 1959-60.

GAGE.--Water-stage recorder. Datum of gage is 616.24 ft (187.830 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Department of Agriculture). Prior to Oct. 1, 1951, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum. Oct. 1, 1951 to July 24, 1969, water-stage recorder at site 50 ft (15 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Some regulation at low flows. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 97.1 ft³/s (2.750 m³/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,720 ft³/s (77.0 m³/s) Mar. 21, 1976; maximum gage height, 10.64 ft (3.243 m) Mar. 6, 1974, backwater from ice; minimum discharge, 5.9 ft³/s (0.17 m³/s) Nov. 3, 1966, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 475 ft³/s (13.5 m³/s) Mar. 20, gage height, 5.10 ft (1.554 m), backwater from ice; minimum discharge, 18 ft³/s (0.51 m³/s) Oct. 1; minimum gage height, 0.77 ft (0.235 m) Aug. 8, 9, 10, 17, 19.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	20	44	60	56	40	33	124	261	68	94	46	57
2	20	51	56	53	39	33	132	246	117	81	35	60
3	22	41	56	55	38	33	132	213	92	69	31	72
4	24	38	59	58	38	33	151	179	75	60	26	53
5	24	36	60	58	37	33	174	160	61	47	24	45
6	24	36	64	44	36	33	178	124	59	39	23	39
7	25	47	62	44	35	34	168	111	65	35	22	31
8	25	41	67	47	35	34	194	101	93	65	21	28
9	31	37	53	51	34	34	343	83	75	51	21	33
10	31	39	55	53	34	34	328	74	74	41	21	39
11	29	44	55	62	34	34	291	69	73	37	24	33
12	33	47	55	70	33	34	321	66	60	34	29	30
13	31	47	54	74	33	35	330	76	43	33	25	68
14	30	50	49	68	33	40	282	149	52	32	23	96
15	28	52	46	67	33	60	369	114	162	30	24	62
16	27	53	45	62	33	90	357	96	137	30	22	45
17	28	52	44	60	33	200	279	87	93	30	20	102
18	28	51	46	59	33	250	243	344	77	29	20	90
19	32	50	50	58	33	290	227	316	120	27	19	60
20	44	47	49	56	33	350	245	245	228	29	20	50
21	30	49	49	54	33	330	228	206	168	38	26	46
22	30	70	51	52	33	280	205	175	113	38	64	55
23	59	82	72	50	33	240	168	150	79	79	35	110
24	49	77	121	47	33	210	151	144	69	49	28	72
25	35	64	222	46	33	180	162	126	70	38	26	54
26	31	136	130	45	33	160	152	98	54	38	25	52
27	30	113	94	44	33	135	133	81	49	58	24	45
28	35	81	84	43	33	110	128	75	71	50	26	42
29	42	67	70	42	33	119	263	70	105	52	31	41
30	39	61	68	42	---	124	287	68	94	58	28	38
31	37	---	64	41	---	128	---	76	---	57	32	---
TOTAL	973	1703	2110	1661	994	3733	6745	4383	2696	1448	841	1648
MEAN	31.4	56.8	68.1	53.6	34.3	120	225	141	89.9	46.7	27.1	54.9
MAX	59	136	222	74	40	350	369	344	228	94	64	110
MIN	20	36	44	41	33	33	124	66	43	27	19	28
CFSM	.19	.34	.40	.32	.20	.71	1.33	.83	.53	.28	.16	.33
IN.	.21	.37	.46	.37	.22	.82	1.48	.96	.59	.32	.19	.36

CAL YR 1979 TOTAL 47398 MEAN 130 MAX 1000 MIN 18 CFSM .77 IN 10.43
WTR YR 1980 TOTAL 28935 MEAN 79.1 MAX 369 MIN 19 CFSM .47 IN 6.37

04140500 RIFLE RIVER AT SELKIRK, MI

LOCATION.--Lat 44°18'48", long 84°04'10", in SE¼ NE¼ sec.9, T.22 N., R.3 E., Ogemaw County, Hydrologic Unit 04080101, on left bank at upstream side of bridge on State Road at Selkirk, 1.0 mi (1.6 km) downstream from Klacking Creek.

DRAINAGE AREA.--117 mi² (303 km²).

PERIOD OF RECORD.--September 1950 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 828.47 ft (252.518 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--30 years, 143 ft³/s (4.050 m³/s), 16.60 in/yr (422 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,760 ft³/s (78.2 m³/s) May 20, 1959, gage height, 6.76 ft (2.060 m); minimum, 52 ft³/s (1.47 m³/s) July 23, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 538 ft³/s (15.2 m³/s) Apr. 9, gage height, 3.03 ft (0.924 m); maximum gage height, 3.47 ft (1.058 m) Jan. 11, backwater from ice; only peak above base of 500 ft³/s (14.2 m³/s); minimum discharge, 72 ft³/s (2.04 m³/s) Mar. 12, gage height, 1.54 ft (0.469 m), result of freezeup.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	94	116	145	121	102	94	174	221	114	123	103	217
2	91	120	140	118	102	94	194	194	122	114	102	215
3	94	114	135	112	102	94	193	182	116	105	101	181
4	92	108	130	112	100	94	175	177	107	100	94	146
5	95	107	126	115	100	94	174	163	102	95	93	125
6	92	110	133	115	100	94	202	151	119	91	91	112
7	95	109	132	115	100	94	194	144	131	90	88	105
8	94	107	132	115	100	96	239	139	145	94	91	102
9	106	104	130	115	100	96	453	133	126	89	92	118
10	102	106	126	115	100	96	503	129	121	88	89	120
11	99	108	130	115	99	98	399	127	111	93	94	105
12	105	106	130	115	98	96	326	123	103	91	122	102
13	102	109	125	112	98	96	318	146	100	89	106	136
14	100	112	121	110	98	96	272	211	123	86	106	162
15	99	110	120	110	99	96	298	179	201	88	98	143
16	98	110	120	108	98	93	311	157	163	85	96	129
17	96	110	120	105	98	96	245	145	134	112	95	259
18	97	113	120	102	98	160	220	270	117	97	96	263
19	101	114	120	102	99	200	209	331	202	94	93	182
20	119	116	115	100	100	397	233	244	373	133	97	150
21	107	116	115	100	100	425	224	196	277	163	112	136
22	107	146	112	100	100	261	207	168	187	123	134	147
23	154	173	144	100	99	226	196	149	151	111	114	174
24	153	163	200	100	98	177	186	138	130	101	106	142
25	126	151	300	100	94	156	184	135	118	97	102	127
26	115	235	241	100	94	190	174	123	111	106	101	125
27	110	265	181	100	94	157	175	111	102	140	98	115
28	121	192	158	100	94	160	174	108	152	125	101	112
29	118	161	144	100	94	183	233	103	174	122	113	108
30	113	146	136	100	---	198	248	114	137	117	148	106
31	110	---	127	100	---	194	---	119	---	104	133	---
TOTAL	3305	3957	4408	3332	2858	4701	7333	5030	4369	3268	3209	4364
MEAN	107	132	142	107	98.6	152	244	162	146	105	104	145
MAX	154	265	300	121	102	425	503	331	373	163	148	263
MIN	91	104	112	100	94	93	174	103	100	85	88	102
CFSM	.92	1.13	1.21	.92	.84	1.30	2.09	1.39	1.25	.90	.89	1.24
IN.	1.05	1.26	1.40	1.06	.91	1.49	2.33	1.60	1.39	1.04	1.02	1.39

CAL YR 1979 TOTAL 56455 MEAN 155 MAX 751 MIN 62 CFSM 1.33 IN 17.95
WTR YR 1980 TOTAL 50134 MEAN 137 MAX 503 MIN 85 CFSM 1.17 IN 15.94

04142000 RIFLE RIVER NEAR STERLING, MI
(National stream-quality accounting network station)

LOCATION.--Lat 44°04'21", long 84°01'12", in NE¼ SW¼ sec.5, T.19 N., R.4 E., Arenac County, Hydrologic Unit 04080101, on left bank 30 ft (9 m) downstream from bridge on Old M-70, 2.8 mi (4.5 km) north of Sterling, and 20 mi (32 km) upstream from mouth.

DRAINAGE AREA.--320 mi² (830 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--November 1905 to December 1908 (gage heights and discharge measurements only), October 1936 to current year. Monthly discharge only for some periods, published in WSP 1307. Published as Rifle River at Michigan Highway 70 near Sterling 1936-61.

REVISED RECORDS.--WSP 1437: 1937(M), 1939-40(M).

GAGE.--Water-stage recorder. Datum of gage is 649.48 ft (197.962 m) National Geodetic Vertical Datum of 1929. November 1905 to December 1908, nonrecording gage at site 400 ft (122 m) downstream at different datum. Jan. 13, 1937, to Jan. 10, 1939, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Occasional regulation by dams above station.

AVERAGE DISCHARGE.--44 years, 306 ft³/s (8.666 m³/s), 12.99 in/yr (330 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 5,340 ft³/s (151 m³/s) Mar. 28, 1950, gage height, 13.74 ft (4.188 m), from rating curve extended above 3,800 ft³/s (108 m³/s); minimum, 75 ft³/s (2.12 m³/s) Nov. 22, 1964, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,100 ft³/s (31.2 m³/s) Apr. 10, gage height, 5.00 ft (1.524 m); maximum gage height, 7.34 ft (2.237 m) Mar. 21, backwater from ice; no peak above base of 1,600 ft³/s (45.3 m³/s); minimum discharge, 138 ft³/s (3.91 m³/s) Aug. 10, 17, 27, 28, gage height, 1.39 ft (0.424 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	248	219	230	240	150	155	383	528	243	264	178	316
2	210	229	230	225	150	155	392	464	295	242	164	378
3	203	221	228	205	150	155	412	405	272	224	164	331
4	207	216	228	190	150	158	393	372	242	210	157	254
5	224	208	226	180	150	160	382	346	222	201	151	209
6	201	209	225	170	150	160	415	341	240	188	148	183
7	190	207	225	160	150	162	421	340	287	180	143	167
8	188	202	225	155	150	162	459	311	329	194	144	158
9	204	200	225	150	150	162	886	298	284	205	145	176
10	207	199	225	150	150	165	1070	274	254	193	140	205
11	197	200	222	150	150	165	902	263	234	187	146	178
12	202	197	222	150	150	165	751	247	215	186	169	166
13	236	199	222	150	152	170	684	269	204	179	172	232
14	275	203	222	150	152	170	568	421	223	172	161	306
15	234	207	220	150	152	172	603	406	436	171	153	278
16	212	208	220	150	152	175	660	345	383	169	143	241
17	199	206	220	150	152	180	532	308	297	174	140	401
18	195	207	220	150	152	200	453	563	245	183	142	551
19	202	204	220	150	152	400	421	779	290	169	141	369
20	228	203	220	150	152	700	456	621	676	177	142	288
21	223	211	220	150	152	960	463	524	580	269	153	251
22	213	252	225	150	152	810	428	412	386	237	227	265
23	285	315	250	150	152	600	415	327	318	213	178	353
24	325	305	330	150	155	520	374	298	262	185	161	297
25	282	269	560	150	155	460	379	282	234	168	149	253
26	230	394	507	150	155	410	362	262	221	181	146	245
27	227	537	378	150	155	378	372	241	209	252	143	228
28	243	387	318	150	155	357	391	232	299	238	144	214
29	245	308	240	150	155	386	505	226	411	218	159	208
30	221	276	270	150	---	426	591	234	310	216	224	201
31	213	---	255	150	---	425	---	250	---	189	258	---
TOTAL	6949	7395	8040	4975	4402	9823	15526	11174	9092	6234	4985	7898
MEAN	224	247	261	160	152	317	517	361	303	201	161	263
MAX	325	537	560	240	155	960	1070	779	676	269	258	551
MIN	188	197	220	150	150	155	362	226	204	168	140	158
CFSM	.70	.77	.82	.50	.48	.99	1.62	1.13	.95	.63	.50	.82
IN.	.81	.86	.94	.58	.51	1.14	1.80	1.30	1.06	.72	.58	.92

CAL YR 1979 TOTAL 125838 MEAN 345 MAX 1940 MIN 131 CFSM 1.08 IN 14.63
WTR YR 1980 TOTAL 96536 MEAN 264 MAX 1070 MIN 140 CFSM .83 IN 11.22

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.
SUSPENDED-SEDIMENT DISCHARGE: Water year 1970.

INSTRUMENTATION.--Water-quality monitor since August 1975.

REMARKS.--Monthly samples are collected as a cross-section sample at or near vicinity of bridge. Interruptions in the daily record are due to malfunctions of the instrument. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 567 micromhos Sept. 6, 1978; minimum, 157 micromhos Aug. 31, 1975.
WATER TEMPERATURES: Maximum, 30.5°C July 20, 1977; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 510 micromhos Dec. 12, 18; minimum, 334 micromhos Aug. 13.
WATER TEMPERATURES: Maximum, 27.5°C Aug. 7; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 02...	1130	198	386	8.1	16.0	10.0	103	30	25	190	28	54
NOV 06...	1130	200	426	8.1	6.0	11.4	93	60	K11	210	25	61
DEC 03...	1100	195	494	7.8	.0	13.2	91	K16	K27	230	31	65
JAN 08...	1230	80	480	7.7	.0	13.4	92	K5	K7	240	54	69
FEB 08...	1130	149	422	7.6	.0	--	--	<1	K6	220	35	63
MAR 11...	1100	170	424	7.2	.0	12.2	95	K8	K63	200	32	57
APR 15...	1100	542	367	7.8	3.5	14.2	106	55	K92	180	37	51
MAY 20...	1045	603	365	7.9	14.0	9.9	100	K180	K50	170	12	49
JUN 19...	1000	243	415	7.9	15.0	8.7	87	K30	K57	190	23	56
JUL 15...	1030	167	407	8.0	24.5	7.8	95	90	35	200	22	56
AUG 22...	1100	237	370	8.0	18.0	11.2		2100	435	190	25	51
SEP 19...	1130	360	459	8.3	12.0	11.4	109	790	180	230	48	65

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 02...	14	0	8.7	.3	9	1.3	200	0	160	2.5	26
NOV 06...	15	0	12	.4	15	1.0	230	0	190	2.9	29
DEC 03...	16	--	13	.4	15	1.1	240	0	200	6.1	36
JAN 08...	17	0	14	.4	15	1.2	230	0	190	7.3	39
FEB 08...	16	0	12	.4	10	1.0	230	0	190	9.2	37
MAR 11...	15	--	11	.3	10	.9	210	0	170	21	30
APR 15...	12	--	8.6	.3	9	1.6	170	0	140	4.3	30
MAY 20...	12	0	8.8	.3	10	1.3	180	0	150	3.9	25
JUN 19...	14	--	10	.3	10	1.1	210	0	170	4.2	29
JUL 15...	15	--	11	.3	11	.9	220	0	180	3.5	29
AUG 22...	14	0	9.0	.3	10	1.0	190	0	160	3.1	27
SEP 19...	16	0	11	.3	9	2.3	210	0	180	1.8	33

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
02...	17	.2	6.0	239	226	128	--	.04	.060	.000	.07
NOV											
06...	17	.1	7.5	273	256	147	.07	.08	.060	.020	.07
DEC											
03...	21	.1	9.8	303	282	160	.29	.29	.030	.000	.04
JAN											
08...	23	.2	9.6	302	288	65.4	.41	.35	.090	.000	.11
FEB											
08...	17	.2	10	271	271	109	.23	.21	.100	.100	.12
MAR											
11...	17	.1	9.6	260	246	119	.35	.34	.050	.010	.06
APR											
15...	16	.0	6.3	241	211	353	.41	.40	.020	.020	.02
MAY											
20...	14	.2	6.4	243	214	396	.21	.18	--	.050	--
JUN											
19...	17	.2	5.6	279	234	193	.21	.21	.040	.000	.05
JUL											
15...	16	.2	4.4	275	241	124	.01	.00	.020	.000	.02
AUG											
22...	15	.2	8.2	257	222	144	.12	.12	.100	.010	.12
SEP											
19...	19	.0	10	283	267	275	.65	.48	--	.140	--

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
02...	.32	.38	.39	1.7	.020	.06	.010	--	6	3.2	100
NOV											
06...	.12	.18	.25	1.1	.010	.03	.010	4.4	8	4.3	100
DEC											
03...	.53	.56	.85	3.8	.010	.03	.010	6.0	11	5.8	100
JAN											
08...	.21	.30	.71	3.1	.020	.06	.010	--	14	3.0	100
FEB											
08...	.15	.25	.48	2.1	.010	.03	.010	6.3	7	2.8	100
MAR											
11...	.19	.24	.59	2.6	.030	.09	.010	3.8	9	4.1	100
APR											
15...	.70	.72	1.1	5.0	.070	.21	.020	--	83	121	100
MAY											
20...	--	.86	1.1	4.7	.080	.25	.030	15	74	120	100
JUN											
19...	.45	.49	.70	3.1	.050	.15	.020	6.6	29	19	100
JUL											
15...	.36	.36	.37	1.6	.050	.15	.060	6.8	19	8.6	100
AUG											
22...	.39	.49	.61	2.7	.030	.09	.010	7.8	44	28	100
SEP											
19...	.65	.74	1.4	6.2	.040	.12	.030	--	62	60	100

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT 02...	1130	6	4	--	50	--	3	--	40	--
JAN 08...	1230	2	1	100	70	--	2	20	10	0
APR 15...	1100	1	3	100	50	--	1	30	20	0
SEP 19...	1130	3	4	100	0	0	0	30	<10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT 02...	1	2	2	520	30	3	0	--	7	<.5
JAN 08...	0	2	2	300	30	1	0	30	20	.1
APR 15...	1	7	1	1200	50	4	0	70	10	.2
SEP 19...	0	4	4	920	10	0	0	80	10	.4

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT 02...	<.5	1	1	0	0	0	--	2	10	.5
JAN 08...	.1	2	1	0	0	0	40	50	3.8	--
APR 15...	.2	2	2	0	0	0	20	130	14	1.6
SEP 19...	.4	2	2	0	0	0	40	10	16	1.1

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV 06...	1130	35	94.7	2.52	2.83	5.67	.240
JUN 19...	1000	30	926	2.28	2.91	.680	.080

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 22,78 1115	MAR 15,79 1200	MAY 15,79 1330	JUN 22,79 1100	JUL 18,79 1130
TOTAL CELLS/ML	250	390	1400	2000	2800
DIVERSITY: DIVISION	1.2	0.2	1.4	1.4	1.8
.CLASS	1.2	0.2	1.4	1.4	1.8
..ORDER	1.5	0.2	1.8	1.8	2.2
...FAMILY	1.5	2.3	2.1	2.8	2.9
....GENUS	1.5	3.2	2.3	2.8	2.9

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	61	2
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	26	1	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	--	-	--	-	37	1
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	26	1	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	--	-	--	-	--	-	100	5	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	14	4	--	-	--	-	73	3
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	1100#	40
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	14	6	--	-	77	6	160	8	220	8
....MELOSIRA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	260#	19	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	14	4	--	-	13	1	--	-
....COCCONEIS	--	-	14	4	--	-	26	1	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	14	4	--	-	--	-	24	1
....CYMBELLA	--	-	29	7	--	-	26	1	24	1
...DIATOMACEAE										
....DIATOMA	72#	29	58	15	--	-	160	8	220	8
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	64	5	--	-	--	-
....FRAGILARIA	--	-	29	7	--	-	--	-	--	-
....SYNEDRA	--	-	29	7	--	-	52	3	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	14	4	--	-	--	-	--	-
...NAVICULACEAE										
....GYROSIGMA	--	-	14	4	--	-	--	-	--	-
....NAVICULA	--	-	100#	26	150	11	340#	17	220	8
....NEIDIUM	--	-	58	15	--	-	--	-	--	-
....PLEUROSIGMA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	77	6	230	12	190	7
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	120	4
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	130	9	26	1	37	1

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 22,78		MAR 15,79		MAY 15,79		JUN 22,79		JUL 10,79	
TIME	1115		1200		1330		1100		1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	26	1	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	390	14
....OSCILLATORIA	--	-	--	-	620#	45	780#	39	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	140#	59	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....EUTREPTIA	--	-	--	-	--	-	--	-	37	1
....TRACHELOMONAS	14	6	--	-	--	-	13	1	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 7,79		SEP 11,79		NOV 6,79		MAR 11,80		MAY 20,80	
TIME	1100		1100		1130		1100		1045	
TOTAL CELLS/ML	680		570		180		160		1100	
DIVERSITY: DIVISION	1.0		1.1		1.1		1.0		1.6	
.CLASS	1.0		1.4		1.1		1.4		1.6	
..ORDER	1.7		1.7		1.1		1.8		2.0	
...FAMILY	2.0		3.4		2.4		1.9		2.8	
....GENUS	2.0		3.5		2.6		2.2		2.9	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	13	2	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	35	6	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	81	14	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	13	1
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	26	14	15	10	13	1
....CHLORELLA	--	-	15	3	--	-	50*	32	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	26	2
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	13	7	--	-	13	1
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	77	11	61	11	--	-	--	-	26	2
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	400*	58	10	2	--	-	5	3	13	1
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	64	9	25	4	--	-	5	3	90	9
....MELOSIRA	--	-	5	1	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	5	1	--	-	--	-	--	-
....COCCONEIS	--	-	20	4	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	40	7	39*	21	--	-	--	-
...DIATOMACEAE										
....DIATOMA	13	2	71	12	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	26	14	5	3	26	2
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	5	1	--	-	--	-	13	1
...NAVICULACEAE										
....GYROSIGMA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	64	9	130*	23	52*	29	55*	35	330*	32
....NEIDIUM	--	-	--	-	--	-	--	-	--	-
....PLEUROSIGMA	--	-	5	1	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	39	6	15	3	13	7	--	-	100	10
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	13	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	25	4	--	-	20	13	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	13	2	--	-	--	-	--	-	13	1
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	13	7	--	-	13	1

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 7,79 1100		SEP 11,79 1100		NOV 6,79 1130		MAR 11,80 1100		MAY 20,80 1045	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	--	-	--	-	310#	29
..HORMOGONALES										
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	26	2
....EUTREPTIA	--	-	20	4	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	13	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

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04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 19,80		JUL 15,80		AUG 22,80		SEP 19,80	
TIME	1000		1030		1100		1130	
TOTAL CELLS/ML	1100		260		740		1500	
DIVERSITY: DIVISION	1.5		1.1		1.3		1.4	
.CLASS	1.5		1.1		1.3		1.4	
..ORDER	2.0		1.8		1.6		1.8	
...FAMILY	2.9		2.5		3.0		2.0	
....GENUS	2.9		2.8		3.1		2.1	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	26	2
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	39	15	--	-	26	2
....CHLORELLA	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-
....OOCYSTIS	26	2	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	13	5	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	--	-	--	-	77	10	51	4
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	26	2	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	--	-	13	5	--	-	13	1
...VOLVOCACEAE								
....PANDORINA	210#	19	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	65	6	39	15	52	7	13	1
....MELOSIRA	--	-	--	-	--	-	190	13
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	26	2	13	5	13	2	26	2
....RHOICOSPHENIA	13	1	13	5	13	2	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	26	3	--	-
...DIATOMACEAE								
....DIATOMA	78	7	--	-	64	8	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	26	2	--	-	39	5	--	-
....SYNEDRA	--	-	--	-	13	2	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....GYROSIGMA	--	-	--	-	--	-	--	-
....NAVICULA	300#	26	90#	35	190#	25	280#	19
....NEIDIUM	--	-	--	-	--	-	--	-
....PLEUROSIGMA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	130	11	26	10	150#	20	26	2
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	13	5	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	13	1	--	-	13	2	--	-

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 19,80 1000		JUL 15,80 1030		AUG 22,80 1100		SEP 19,80 1130	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	--	-	--	-	120	15	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	800*	54
....OSCILLATORIA	220*	28	--	-	--	-	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	--	-	13	2	--	-
....EUTREPTIA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	13	1

NOTE: * - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
- OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	394	387	391	---	---	---	453	441	446	473	461	471
2	401	390	397	---	---	---	474	440	453	477	440	460
3	410	400	405	---	---	---	474	459	467	449	430	437
4	420	354	406	---	---	---	477	442	466	440	430	435
5	414	382	405	---	---	---	464	440	449	437	429	433
6	433	417	427	---	---	---	457	443	449	438	431	436
7	429	420	426	476	465	472	457	443	447	441	431	437
8	433	414	427	477	466	472	461	443	449	---	---	---
9	426	410	418	476	462	470	462	446	455	500	492	496
10	427	424	426	454	442	455	467	449	457	507	494	501
11	429	391	411	452	447	455	---	---	---	500	461	481
12	409	378	391	459	445	456	510	442	478	465	430	455
13	421	367	407	452	439	447	450	437	442	432	399	412
14	397	375	386	451	435	444	442	436	438	422	402	412
15	417	397	406	449	435	443	464	438	446	439	423	436
16	430	419	425	449	436	441	473	441	454	443	426	439
17	446	433	439	448	436	442	505	475	489	425	392	410
18	---	---	---	455	440	448	510	488	502	383	344	355
19	---	---	---	455	438	448	499	458	473	381	347	361
20	---	---	---	448	436	442	460	447	452	414	383	399
21	---	---	---	451	438	445	451	436	442	439	415	427
22	---	---	---	444	436	440	437	425	430	446	433	438
23	---	---	---	441	432	436	423	411	417	458	443	449
24	---	---	---	448	411	437	498	444	464	475	458	466
25	---	---	---	451	439	445	495	453	474	484	472	479
26	---	---	---	435	404	417	463	445	457	474	465	470
27	---	---	---	440	406	416	471	440	457	469	461	465
28	---	---	---	435	408	422	468	431	442	469	461	465
29	---	---	---	439	428	434	465	432	439	478	465	471
30	---	---	---	443	436	439	452	431	438	474	462	468
31	---	---	---	---	---	---	495	430	449	478	463	473

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	488	478	482	479	462	471	---	---	---	393	387	391
2	500	482	493	488	466	476	---	---	---	397	386	391
3	505	492	498	476	462	469	---	---	---	403	397	399
4	504	493	498	463	454	459	---	---	---	406	400	403
5	493	486	489	452	442	447	---	---	---	408	403	406
6	487	478	482	450	442	444	---	---	---	414	388	406
7	482	467	473	457	448	453	---	---	---	399	390	396
8	465	455	459	458	451	455	---	---	---	403	398	401
9	460	456	458	470	454	462	---	---	---	407	400	404
10	461	458	460	460	445	453	---	---	---	417	407	412
11	460	455	457	---	---	---	---	---	---	421	416	419
12	458	454	456	---	---	---	---	---	---	422	418	420
13	456	451	453	---	---	---	---	---	---	424	394	412
14	452	444	447	---	---	---	---	---	---	397	391	393
15	448	445	447	---	---	---	---	---	---	395	389	391
16	454	448	451	---	---	---	388	384	386	395	384	389
17	457	454	456	---	---	---	393	383	387	399	388	396
18	461	457	459	---	---	---	401	392	396	388	363	373
19	461	446	455	---	---	---	407	402	404	379	372	375
20	445	438	442	---	---	---	409	401	405	381	372	376
21	442	435	438	---	---	---	409	404	407	381	373	377
22	442	430	434	---	---	---	412	406	409	397	380	386
23	438	433	435	---	---	---	411	401	404	404	398	401
24	433	429	432	---	---	---	410	402	405	408	399	405
25	448	433	437	---	---	---	408	398	402	412	400	407
26	458	452	456	---	---	---	409	405	407	412	399	406
27	463	455	458	---	---	---	406	398	403	410	397	405
28	457	454	456	---	---	---	397	388	393	419	401	410
29	466	457	462	---	---	---	389	383	386	417	406	413
30	---	---	---	---	---	---	391	387	389	414	401	409
31	---	---	---	---	---	---	---	---	---	416	407	412
MONTH	505	429	459							424	363	399

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	420	407	415	394	387	390	377	369	373	445	406	424
2	410	400	405	401	392	398	372	365	369	441	418	425
3	422	409	417	413	399	404	372	365	368	449	422	437
4	420	406	414	403	397	399	370	360	365	453'	447	450
5	426	404	416	409	395	402	365	357	361	462	451	457
6	413	402	408	405	393	398	365	356	359	464	456	460
7	412	398	406	401	393	397	361	352	356	463	454	457
8	400	387	394	402	383	395	358	349	353	460	454	458
9	401	391	396	421	388	395	359	351	355	461	443	449
10	405	398	401	391	375	384	352	347	349	450	441	445
11	408	389	401	397	378	388	366	347	352	449	444	447
12	416	391	405	399	385	394	353	344	349	451	442	447
13	417	391	406	399	388	393	342	334	338	447	431	438
14	413	387	400	407	394	401	353	336	344	444	433	440
15	390	372	381	409	397	403	375	352	363	453	444	448
16	384	374	378	407	401	404	375	354	370	459	453	456
17	406	384	393	410	397	403	357	335	340	453	443	448
18	435	408	423	398	387	394	359	336	345	452	450	451
19	434	398	427	398	385	391	377	358	365	460	450	455
20	388	356	368	396	386	394	397	376	384	468	460	464
21	367	356	361	393	376	387	400	396	397	473	466	469
22	384	366	376	389	369	380	416	386	397	471	461	466
23	397	377	384	390	375	383	418	412	415	466	457	462
24	398	391	393	390	379	385	432	418	425	470	465	467
25	406	397	403	386	378	382	434	417	426	471	469	470
26	409	397	403	385	379	382	434	411	422	470	465	468
27	405	399	402	378	375	377	428	409	420	468,	465	466
28	406	358	377	379	372	375	424	414	420	468	464	467
29	379	362	373	383	375	378	427	404	419	468	463	465
30	398	376	391	379	373	376	441	407	419	467	464	466
31	---	---	---	375	370	373	444	400	415	---	---	---
MONTH	435	356	397	421	369	390	444	334	378	473	406	454

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	18.5	16.0	17.5	---	---	---	.0	.0	.0	.0	.0	.0
2	17.0	16.0	16.5	---	---	---	.0	.0	.0	.0	.0	.0
3	17.0	15.5	16.0	---	---	---	.0	.0	.0	.0	.0	.0
4	16.0	14.0	15.0	---	---	---	.0	.0	.0	.0	.0	.0
5	15.5	13.5	14.5	---	---	---	1.0	.0	.5	.0	.0	.0
6	14.0	12.5	13.0	---	---	---	2.0	.5	1.0	.0	.0	.0
7	13.0	11.0	12.0	5.5	4.5	5.0	2.0	.5	1.5	.0	.0	.0
8	11.5	10.0	11.0	5.0	3.5	4.0	.0	.0	.0	.0	.0	.0
9	11.5	9.5	10.0	3.0	1.0	1.5	.0	.0	.0	.0	.0	.0
10	10.0	8.5	9.0	3.0	1.0	2.0	.0	.0	.0	.0	.0	.0
11	8.5	7.0	7.5	2.5	1.0	1.5	---	---	---	.0	.0	.0
12	9.0	7.0	8.0	1.5	.0	1.0	.5	.5	.5	.0	.0	.0
13	9.5	7.0	8.0	3.0	1.0	2.0	.0	.0	.0	.0	.0	.0
14	9.0	7.5	8.5	3.0	1.0	2.0	.0	.0	.0	.0	.0	.0
15	11.0	8.0	9.5	3.0	1.5	2.5	.0	.0	.0	.0	.0	.0
16	11.5	8.0	9.5	2.5	.5	1.5	.0	.0	.0	.0	.0	.0
17	12.0	10.0	11.0	4.0	1.0	2.5	.0	.0	.0	.0	.0	.0
18	---	---	---	4.0	1.5	3.0	.0	.0	.0	.0	.0	.0
19	---	---	---	5.0	2.5	3.5	.0	.0	.0	.0	.0	.0
20	---	---	---	5.5	4.0	5.0	.0	.0	.0	.0	.0	.0
21	---	---	---	5.5	5.0	5.0	.0	.0	.0	.0	.0	.0
22	---	---	---	6.0	5.0	5.5	.0	.0	.0	.0	.0	.0
23	---	---	---	6.0	5.5	6.0	.0	.0	.0	.0	.0	.0
24	---	---	---	5.5	4.5	5.5	.0	.0	.0	.0	.0	.0
25	---	---	---	4.5	3.5	4.0	.0	.0	.0	.0	.0	.0
26	---	---	---	5.5	4.5	5.0	.0	.0	.0	.0	.0	.0
27	---	---	---	5.5	5.0	5.0	.0	.0	.0	.0	.0	.0
28	---	---	---	5.0	3.0	4.5	.0	.0	.0	.0	.0	.0
29	---	---	---	3.0	2.0	2.5	.0	.0	.0	.0	.0	.0
30	---	---	---	2.0	.0	1.0	.0	.0	.0	.0	.0	.0
31	---	---	---	---	---	---	.0	.0	.0	.0	.0	.0
MONTH										.0	.0	.0

04142000 RIFLE RIVER NEAR STERLING, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	FEBRUARY			MARCH			APRIL			MAY		
1	.0	.0	.0	.0	.0	.0	---	---	---	14.0	10.0	11.5
2	.0	.0	.0	.0	.0	.0	---	---	---	15.5	11.5	13.5
3	.0	.0	.0	.0	.0	.0	---	---	---	16.5	13.5	15.0
4	.0	.0	.0	.0	.0	.0	---	---	---	18.5	13.5	16.0
5	.0	.0	.0	.0	.0	.0	---	---	---	18.5	15.0	16.5
6	.0	.0	.0	.0	.0	.0	---	---	---	16.5	14.0	15.5
7	.0	.0	.0	.0	.0	.0	---	---	---	14.0	11.5	13.0
8	.0	.0	.0	.0	.0	.0	---	---	---	11.5	9.5	10.5
9	.0	.0	.0	.0	.0	.0	---	---	---	10.5	8.5	9.5
10	.0	.0	.0	.0	.0	.0	---	---	---	12.0	7.5	10.0
11	.0	.0	.0	---	---	---	---	---	---	15.0	11.0	13.0
12	.0	.0	.0	---	---	---	---	---	---	16.5	12.0	14.5
13	.0	.0	.0	---	---	---	---	---	---	14.0	11.5	13.0
14	.0	.0	.0	---	---	---	---	---	---	12.5	10.0	11.0
15	.0	.0	.0	---	---	---	---	---	---	13.5	10.5	12.0
16	.0	.0	.0	---	---	---	6.0	2.0	4.0	16.0	11.0	13.5
17	.0	.0	.0	---	---	---	6.0	4.0	5.0	14.0	13.0	13.5
18	.0	.0	.0	---	---	---	9.5	4.5	7.0	13.5	12.0	12.5
19	.0	.0	.0	---	---	---	11.5	7.0	9.5	15.5	12.0	13.5
20	.0	.0	.0	---	---	---	13.5	9.0	11.0	17.0	13.5	15.0
21	.0	.0	.0	---	---	---	13.5	9.5	11.5	18.5	14.0	16.0
22	.0	.0	.0	---	---	---	15.0	10.0	12.5	20.5	15.5	18.0
23	.0	.0	.0	---	---	---	15.0	11.5	13.0	22.0	17.0	19.5
24	.0	.0	.0	---	---	---	12.0	8.0	10.0	22.5	18.5	20.0
25	.0	.0	.0	---	---	---	10.5	7.0	8.5	22.0	18.5	20.0
26	.0	.0	.0	---	---	---	9.5	9.0	9.0	20.0	16.0	18.0
27	.0	.0	.0	---	---	---	10.5	8.0	9.5	19.5	15.0	17.0
28	.0	.0	.0	---	---	---	9.5	8.5	9.0	18.5	15.0	16.5
29	.0	.0	.0	---	---	---	9.0	8.0	8.5	18.0	15.0	16.5
30	---	---	---	---	---	---	10.5	9.0	9.5	20.5	16.5	18.0
31	---	---	---	---	---	---	---	---	---	19.0	17.0	18.0
MONTH	.0	.0	.0							22.5	7.5	15.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
	JUNE			JULY			AUGUST			SEPTEMBER		
1	17.0	13.5	15.0	19.5	16.5	18.0	24.0	19.5	21.5	20.0	18.5	19.5
2	16.0	13.0	14.0	22.0	16.5	19.0	22.0	19.5	21.0	19.5	18.5	19.0
3	18.0	14.5	16.0	23.0	17.0	20.0	23.5	18.5	21.0	19.5	16.5	18.0
4	20.0	15.0	17.5	22.0	18.5	20.5	25.0	18.5	21.5	20.5	17.0	18.5
5	18.0	15.0	17.0	25.0	19.5	22.0	24.5	21.0	23.0	22.0	17.5	19.0
6	19.5	16.0	17.5	24.0	19.5	21.5	26.5	20.5	23.5	20.5	16.5	18.5
7	18.5	16.5	17.5	21.0	18.5	19.5	27.5	21.5	24.0	20.0	15.5	18.0
8	17.5	15.0	16.5	24.5	19.0	21.5	26.0	22.0	24.0	22.0	16.5	19.0
9	17.5	14.0	15.5	22.0	19.5	20.5	25.5	22.0	24.0	21.0	18.0	19.5
10	16.5	11.5	14.0	24.5	18.5	22.0	23.5	21.0	22.0	19.0	15.0	17.0
11	18.0	11.5	14.5	26.5	21.5	24.0	22.5	20.0	21.0	18.5	13.5	16.5
12	19.5	13.0	16.0	24.0	21.0	22.5	21.5	19.0	20.0	17.5	16.0	16.5
13	21.5	16.0	18.5	24.0	19.0	21.5	19.5	17.0	18.0	17.5	16.0	16.5
14	20.0	18.0	19.0	25.0	20.5	23.0	21.0	17.0	19.0	16.5	15.0	15.0
15	18.0	15.5	17.0	25.0	23.0	24.0	21.5	17.5	19.5	16.0	14.0	15.0
16	18.0	13.5	15.5	25.0	21.5	23.5	20.5	18.0	19.0	15.5	14.0	15.0
17	19.0	13.5	16.0	24.0	21.5	23.0	20.0	18.0	18.5	15.0	13.5	14.0
18	19.5	15.5	17.5	24.0	20.0	22.5	21.5	17.5	19.5	14.0	13.0	13.5
19	17.5	13.5	15.0	26.5	21.5	24.0	21.0	18.0	19.5	15.0	12.5	13.5
20	15.5	12.0	14.0	24.5	22.5	23.5	23.0	19.0	20.5	16.0	13.5	14.5
21	16.5	14.0	15.5	23.5	21.5	22.5	22.5	20.5	21.5	18.5	15.0	16.5
22	19.5	15.0	17.0	24.0	20.0	22.0	22.5	18.0	20.5	17.5	15.5	16.5
23	23.5	17.5	20.0	24.0	19.5	21.5	22.5	17.5	20.0	16.0	13.5	15.0
24	24.0	19.0	21.5	24.0	19.0	21.5	22.5	17.5	20.0	15.0	12.0	13.5
25	24.5	20.5	22.5	22.0	19.5	21.0	23.0	19.0	21.0	13.0	11.5	12.5
26	26.0	21.5	23.5	21.5	19.5	20.0	24.5	19.5	22.0	13.0	11.0	12.0
27	23.5	19.5	21.0	19.0	18.0	18.5	25.0	21.0	23.0	11.5	9.0	10.0
28	19.0	16.5	18.0	20.5	18.0	19.0	23.0	20.0	21.0	11.5	8.5	10.0
29	18.5	16.5	17.5	22.5	18.5	20.0	23.0	19.0	21.5	13.5	9.0	11.0
30	19.5	16.5	18.0	22.5	18.5	20.5	23.0	20.5	21.5	15.0	11.0	12.5
31	---	---	---	21.5	19.0	20.0	21.5	19.5	20.5	---	---	---
MONTH	26.0	11.5	17.5	26.5	16.5	21.5	27.5	16.0	21.0	22.0	8.5	15.5

04143500 NORTH BRANCH KAWKAWLIN RIVER NEAR KAWKAWLIN, MI

LOCATION.--Lat 43°40'05", long 83°58'13", in SE¼ SE¼ sec.27, T.15 N., R.4 E., Bay County, Hydrologic Unit 04080102, on left bank 50 ft (15 m) upstream from bridge on Beaver Road, 1.7 mi (2.7 km) northwest of Kawkawlin, and 2.4 mi (3.9 km) upstream from mouth.

DRAINAGE AREA.--101 mi² (262 km²).

PERIOD OF RECORD.--March 1951 to current year.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Sept. 26, 1951, nonrecording gage at site 70 ft (21 m) downstream, and Sept. 27, 1951, to Sept. 30, 1960, water-stage recorder at present site, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records fair except those for the winter period, which are poor. Some diversion above station for irrigation. Some regulation during low flows by dams above station. Several observations of water temperature were made during the year. Corps of Engineers gage-height telemark at station.

AVERAGE DISCHARGE.--29 years, 57.8 ft³/s (1.637 m³/s), 7.77 in/yr (197 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,610 ft³/s (45.6 m³/s) May 18, 1974, gage height, 10.92 ft (3.328 m); no flow at times in each year.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 306 ft³/s (8.67 m³/s) Apr. 12, gage height, 6.54 ft (1.993 m); no flow Oct. 1 to Nov. 21, Aug. 22-27, Aug. 30 to Sept. 2, Sept. 5-9, Sept. 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.00	2.1	14	5.0	2.8	65	140	25	8.8	.23	.00
2	.00	.00	1.5	13	3.6	2.8	61	174	34	7.9	.09	.00
3	.00	.00	.87	12	3.2	2.8	60	209	24	9.2	.06	.44
4	.00	.00	.64	11	2.7	2.8	137	196	17	21	.05	.02
5	.00	.00	.73	9.6	2.4	2.8	136	164	12	29	.05	.00
6	.00	.00	1.6	9.2	2.2	2.8	138	131	15	26	.05	.00
7	.00	.00	1.7	9.0	2.0	2.8	147	102	24	21	.05	.00
8	.00	.00	1.8	9.0	1.9	2.8	176	81	33	18	.05	.00
9	.00	.00	1.5	9.4	1.8	2.9	255	65	27	14	.06	.00
10	.00	.00	1.6	9.8	1.8	2.9	245	52	26	11	.05	.03
11	.00	.00	1.9	10	1.8	3.0	228	42	40	9.0	.05	.00
12	.00	.00	2.1	9.8	1.7	3.2	278	34	53	7.6	.05	.00
13	.00	.00	1.8	9.6	1.7	3.3	289	31	57	6.4	.05	6.4
14	.00	.00	1.6	9.0	1.7	3.5	247	29	55	5.2	.05	13
15	.00	.00	1.3	8.7	1.6	4.0	279	26	47	4.7	.05	12
16	.00	.00	1.1	8.4	1.6	16	264	25	37	4.5	.05	12
17	.00	.00	.92	14	1.6	91	247	25	32	4.2	.05	48
18	.00	.00	.75	21	1.6	98	240	64	29	3.7	.04	37
19	.00	.00	.52	21	1.6	155	225	87	25	3.4	.04	13
20	.00	.00	.60	23	1.6	146	191	93	23	2.8	.04	25
21	.00	.00	.21	24	1.6	150	158	162	20	2.3	.02	55
22	.00	1.6	.55	25	1.7	179	130	239	19	2.0	.00	93
23	.00	3.1	2.2	23	2.3	171	109	215	13	2.7	.00	147
24	.00	3.4	14	21	3.2	145	103	170	10	2.3	.00	112
25	.00	3.1	104	19	3.7	125	115	125	9.6	1.2	.00	78
26	.00	4.1	43	17	3.5	119	110	86	8.1	.74	.00	52
27	.00	6.3	20	14	3.3	99	96	59	6.6	1.2	.00	42
28	.00	4.1	17	12	3.2	74	90	44	7.6	1.7	.01	49
29	.00	3.2	16	9.0	3.0	62	132	33	9.8	1.3	.03	53
30	.00	2.7	15	7.2	---	56	142	30	9.8	.86	.00	45
31	.00	---	14	5.6	---	63	---	29	---	.52	.00	---
TOTAL	.00	31.60	272.59	417.3	68.6	1794.2	5093	2962	748.5	234.22	1.27	892.89
MEAN	.000	1.05	8.79	13.5	2.37	57.9	170	95.5	25.0	7.56	.041	29.8
MAX	.00	6.3	104	25	5.0	179	289	239	57	29	.23	147
MIN	.00	.00	.21	5.6	1.6	2.8	60	25	6.6	.52	.00	.00
CFSM	.000	.01	.09	.13	.02	.57	1.68	.95	.25	.08	.000	.30
IN.	.00	.01	.10	.15	.03	.66	1.88	1.09	.28	.09	.00	.33

CAL YR 1979 TOTAL 17907.71 MEAN 49.1 MAX 535 MIN .00 CFSM .49 IN 6.60
WTR YR 1980 TOTAL 12516.17 MEAN 34.2 MAX 289 MIN .00 CFSM .34 IN 4.61

04143900 SHIAWASSEE RIVER AT LINDEN, MI

LOCATION.--Lat 42°48'56", long 83°48'08", in SW¼ sec.19, T.5 N., R.6 E., Genesee County, Hydrologic Unit 04080203, on right bank at upstream side of bridge on Hogan Road, 1.0 mi (1.6 km) west of Linden.

DRAINAGE AREA.--81.2 mi² (210.3 km²).

PERIOD OF RECORD.--October 1967 to current year.

GAGE.--Water-stage recorder. Datum of gage is 844.96 ft (257.544 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated by dam at Linden since 1967. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--13 years, 60.0 ft³/s (1.699 m³/s), 10.03 in/yr (255 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 476 ft³/s (13.5 m³/s) Apr. 22, 1975, gage height, 7.43 ft (2.265 m); minimum, 0.74 ft³/s (0.021 m³/s) May 22, 23, 1971; minimum gage height, 2.82 ft (0.860 m) Aug. 2, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 183 ft³/s (5.18 m³/s) Apr. 12, gage height, 5.93 ft (1.807 m); minimum, 6.8 ft³/s (0.19 m³/s) Mar. 13, result of freezeup; minimum gage height, 3.31 ft (1.009 m) Oct. 1, Mar. 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	8.7	25	72	102	33	58	126	102	60	27	16	26
2	10	26	74	104	30	40	126	101	59	23	18	26
3	12	25	74	104	27	34	126	92	59	19	20	26
4	14	25	73	102	24	30	137	87	51	19	19	26
5	16	24	73	100	21	27	146	82	48	20	20	25
6	15	24	74	90	21	26	143	79	50	20	22	24
7	15	25	73	80	21	26	138	77	50	20	23	24
8	15	26	72	70	21	26	142	74	51	22	28	23
9	15	28	69	62	21	26	154	70	52	21	31	24
10	15	24	62	57	21	26	161	67	53	21	32	24
11	15	28	52	60	23	25	138	66	54	21	32	24
12	15	28	38	65	19	25	180	61	56	21	32	24
13	15	28	38	68	16	25	162	54	55	21	32	27
14	15	32	38	70	12	25	151	50	52	20	32	28
15	14	45	38	70	12	25	144	44	77	20	33	27
16	12	49	40	69	12	27	163	45	78	19	32	28
17	14	54	42	67	12	54	158	51	66	19	31	42
18	18	53	44	66	12	63	141	70	53	18	30	42
19	19	44	45	65	12	66	148	86	50	18	27	42
20	20	41	47	63	12	78	147	94	49	18	22	43
21	21	41	50	61	14	99	145	94	47	17	23	55
22	22	42	54	60	21	118	142	86	46	16	24	63
23	26	44	56	58	31	126	128	85	41	16	24	73
24	25	44	59	55	36	132	124	96	35	15	24	78
25	25	43	65	52	37	147	124	97	35	14	24	83
26	25	45	65	49	44	146	120	92	34	14	24	51
27	24	53	73	47	48	145	107	86	31	17	24	32
28	24	57	76	45	52	126	104	78	27	17	24	32
29	24	61	87	42	54	126	104	66	27	17	24	34
30	23	67	94	39	---	128	103	63	27	17	25	38
31	23	---	99	36	---	124	---	63	---	17	25	---
TOTAL	554.7	1156	1916	2078	719	2149	4132	2358	1474	584	797	1114
MEAN	17.9	38.5	61.8	67.0	24.8	69.3	138	76.1	49.1	18.8	25.7	37.1
MAX	26	67	99	104	54	147	180	102	78	27	33	83
MIN	8.7	24	38	36	12	25	103	44	27	14	16	23
CFSM	.22	.47	.76	.83	.31	.85	1.70	.94	.61	.23	.32	.46
IN.	.25	.53	.88	.95	.33	.98	1.89	1.08	.68	.27	.37	.51

CAL YR 1979 TOTAL 16306.1 MEAN 44.7 MAX 166 MIN 7.7 CFSM .55 IN 7.47
WTR YR 1980 TOTAL 19031.7 MEAN 52.0 MAX 180 MIN 8.7 CFSM .64 IN 8.72

04144000 SHIAWASSEE RIVER AT BYRON, MI

LOCATION.--Lat 42°49'25", long 83°56'45", in NE¼ NE¼ sec.23, T.5 N., R.4 E., Shiawassee County, Hydrologic Unit 04080203, on left bank at upstream side of highway bridge at Byron, 0.3 mi (0.5 km) downstream from milldams which are just upstream from South Branch Shiawassee River.

DRAINAGE AREA.--368 mi² (953 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1144: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 812.00 ft (247.498 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 17, 1960, nonrecording gage and crest-stage gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair. Low flow slightly regulated at times by mills above station.

AVERAGE DISCHARGE.--33 years, 249 ft³/s (7.052 m³/s), 9.19 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,880 ft³/s (110 m³/s) Apr. 22, 1975, gage height, 15.25 ft (4.648 m); minimum, 19 ft³/s (0.54 m³/s), Aug. 16, 1965; minimum gage height, 3.55 ft (1.082 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,140 ft³/s (32.3 m³/s) Apr. 9, gage height, 8.83 ft (2.691 m); minimum, 42 ft³/s (1.19 m³/s) Oct. 1, gage height, 4.14 ft (1.262 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	108	247	298	100	160	533	431	210	103	86	209
2	47	105	250	280	94	150	603	430	207	94	90	254
3	48	117	240	260	99	140	637	413	233	75	157	218
4	52	130	275	240	98	125	748	388	267	73	199	163
5	54	122	289	230	97	115	779	361	298	93	214	136
6	58	125	267	220	96	110	919	340	385	88	181	111
7	60	129	242	225	95	110	1000	319	467	75	139	101
8	59	129	233	230	95	110	1010	301	500	79	123	92
9	64	129	221	235	95	110	1130	283	410	83	115	91
10	65	132	207	243	96	110	1100	265	424	85	117	108
11	66	139	202	260	98	110	1050	226	376	86	124	117
12	66	136	206	280	105	110	903	162	326	90	142	105
13	68	134	205	305	95	110	747	229	283	104	170	124
14	67	133	196	326	90	110	689	248	257	102	176	175
15	63	131	190	304	84	110	727	273	246	95	166	221
16	62	131	168	254	86	130	809	256	239	93	158	218
17	63	136	127	249	88	200	862	298	243	88	132	261
18	64	140	140	265	90	400	861	391	258	86	115	285
19	70	143	150	285	94	700	753	469	234	85	113	317
20	74	147	166	267	105	922	565	533	224	82	120	288
21	100	141	160	220	120	1010	439	552	220	79	154	244
22	121	128	165	190	186	985	413	497	209	81	141	238
23	130	140	182	150	232	921	408	441	192	79	145	270
24	147	165	230	130	320	871	379	441	165	76	149	320
25	170	182	314	125	371	821	361	397	145	71	129	343
26	172	192	378	120	300	756	346	352	122	64	125	385
27	161	222	440	115	220	713	334	336	130	101	118	436
28	128	266	472	115	180	596	337	303	129	114	105	356
29	117	265	456	110	165	507	344	237	121	101	105	318
30	112	257	386	105	---	476	392	194	113	97	117	253
31	105	---	333	105	---	492	---	203	---	97	158	---
TOTAL	2677	4554	7737	6741	3994	12290	20178	10569	7633	2719	4283	6757
MEAN	86.4	152	250	217	138	396	673	341	254	87.7	138	225
MAX	172	266	472	326	371	1010	1130	552	500	114	214	436
MIN	44	105	127	105	84	110	334	162	113	64	86	91
CFSM	.24	.41	.68	.59	.38	1.08	1.83	.93	.69	.24	.38	.61
IN.	.27	.46	.78	.68	.40	1.24	2.04	1.07	.77	.27	.43	.68

CAL YR 1979 TOTAL 72076 MEAN 197 MAX 1200 MIN 44 CFSM .54 IN 7.29
WTR YR 1980 TOTAL 90137 MEAN 246 MAX 1130 MIN 44 CFSM .67 IN 9.11

STREAMS TRIBUTARY TO LAKE HURON

04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Water years 1962 to current year.

INSTRUMENTATION.--Temperature recorder since March 1962.

REMARKS.--Interruptions in the record were due to malfunctions of the instrument.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum, 29.0°C June 28, 1971, July 9, 10, 1974, July 31, 1975; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 22.0°C Sept. 5; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	18.0	16.5	9.5	9.0	1.5	1.0	1.5	1.5	.0	.0	.5	.5
2	18.0	17.5	9.5	7.5	1.0	.5	1.5	1.5	.5	.0	.5	.5
3	17.0	16.0	7.5	5.5	1.0	1.0	1.5	1.0	.5	.5	.5	.5
4	16.0	15.0	6.5	5.5	1.0	1.0	1.0	.5	.5	.5	.5	.5
5	15.0	13.5	6.0	5.5	1.0	1.0	.5	.5	.5	.5	1.0	1.0
6	13.5	12.0	5.5	5.5	2.0	2.0	.5	.5	.5	.5	1.0	1.0
7	12.0	10.5	6.0	5.0	2.0	2.0	1.0	1.0	.5	.5	1.0	1.0
8	10.5	9.0	5.0	4.0	2.0	1.0	1.0	1.0	.5	.5	1.0	1.0
9	9.5	9.5	4.0	3.0	1.0	1.0	1.0	1.0	.5	.5	1.0	1.0
10	9.5	9.0	3.0	3.0	1.0	1.0	1.0	1.0	.5	.5	1.0	1.0
11	9.0	7.5	3.0	3.0	2.5	1.0	1.0	.5	.5	.5	1.5	1.0
12	7.0	6.5	3.0	2.0	3.5	3.0	.5	.0	.5	.5	1.5	1.5
13	7.5	6.5	2.5	2.0	3.0	2.0	.0	.0	.5	.5	1.5	1.5
14	6.5	5.5	2.0	2.0	2.0	.5	.0	.0	.5	.5	1.5	1.5
15	8.0	6.5	2.0	2.0	.5	.0	.0	.0	.5	.5	1.5	1.5
16	8.5	7.5	2.5	2.0	.0	.0	.0	.0	.5	.5	1.5	1.5
17	8.5	8.5	3.0	2.0	.0	.0	.0	.0	.5	.5	1.5	1.5
18	11.0	9.5	4.0	3.0	.0	.0	.0	.0	.5	.5	1.5	1.5
19	11.5	11.0	5.0	4.0	.0	.0	.0	.0	.5	.5	2.0	1.5
20	13.0	11.5	5.5	5.0	.0	.0	.0	.0	.5	.5	3.0	2.0
21	15.5	13.0	6.5	5.5	.0	.0	.0	.0	.5	.5	3.0	2.0
22	17.0	15.5	7.5	6.0	.0	.0	.0	.0	.5	.5	3.5	2.5
23	17.0	12.5	7.5	7.5	.5	.0	.0	.0	.5	.5	3.5	3.5
24	12.5	9.5	7.5	6.5	2.0	1.0	.0	.0	.5	.5	3.5	3.0
25	9.5	7.5	6.5	5.5	2.5	2.0	.0	.0	.5	.5	3.0	3.0
26	7.5	6.0	5.5	5.5	2.0	1.5	.0	.0	.5	.5	3.0	3.0
27	6.0	5.5	4.5	3.0	1.5	1.0	.0	.0	.5	.5	4.5	3.0
28	6.5	6.0	4.5	3.5	1.0	1.0	.0	.0	.5	.5	5.0	4.5
29	7.0	6.0	2.5	1.0	1.5	1.5	.0	.0	.5	.5	5.5	5.0
30	7.5	6.5	2.5	1.5	1.5	1.5	.0	.0	---	---	5.5	5.0
31	9.0	7.5	---	---	1.5	1.5	.0	.0	---	---	5.5	5.0
MONTH	18.0	5.5	9.5	1.0	3.5	.0	1.5	.0	.5	.0	5.5	.5

04144000 SHIAWASSEE RIVER AT BYRON, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.0	5.0	---	---	15.5	14.0	13.0	11.0			---	---
2	6.5	5.0	---	---	14.5	13.5	14.5	12.0			---	---
3	6.5	6.0	---	---	15.5	14.5	15.0	11.5			---	---
4	6.0	5.5	---	---	16.0	14.0	15.0	12.5			---	---
5	6.5	4.5	---	---	16.0	15.0	15.0	12.0			22.0	21.0
6	8.0	6.5	---	---	17.0	15.0	14.5	12.0			21.5	20.5
7	8.5	8.0	---	---	17.0	16.5	14.0	12.0			21.0	19.5
8	9.0	8.5	---	---	17.0	15.5	15.0	13.0			21.0	19.0
9	9.0	8.5	---	---	15.5	15.0	15.0	13.0			21.0	20.0
10	---	---	---	---	15.0	13.5	16.0	13.0			20.0	18.0
11	---	---	---	---	15.0	13.0	17.0	14.0			19.0	17.0
12	---	---	---	---	16.0	14.5	16.5	14.0			18.0	17.5
13	---	---	---	---	16.5	16.0	15.5	13.0			18.5	17.5
14	---	---	16.0	14.0	16.5	15.5	16.0	14.0			18.5	16.5
15	---	---	15.0	13.5	15.5	13.5	16.0	15.0			18.5	18.0
16	---	---	16.0	13.5	15.0	13.0	16.0	15.5			18.0	17.5
17	---	---	16.0	15.0	16.5	13.5	15.5	14.5			17.5	16.0
18	---	---	15.0	15.0	16.5	15.0	15.5	14.5			16.0	14.0
19	---	---	16.0	14.5	16.5	15.0	16.0	15.0			15.5	14.5
20	---	---	15.5	15.0	16.0	13.5	17.5	15.0			16.0	15.5
21	---	---	16.0	15.0	16.0	14.5	17.5	16.0			18.5	16.0
22	---	---	16.0	15.0	16.0	15.0	17.0	15.5			19.0	18.0
23	---	---	16.0	15.0	16.0	15.0	16.5	14.5			19.0	17.5
24	---	---	15.5	15.0	16.0	16.0	16.0	14.0			17.5	15.5
25	---	---	15.5	14.5	17.0	15.5	16.0	14.0			16.0	15.0
26	---	---	15.0	14.5	17.0	15.0	16.0	14.0			15.0	14.0
27	---	---	16.0	14.0	17.0	15.0	14.0	13.0			14.0	13.0
28	---	---	16.0	15.0	15.5	13.0	13.0	13.0			13.0	12.5
29	---	---	16.0	15.0	15.5	13.0	13.0	12.0			14.0	13.0
30	---	---	16.0	15.0	14.5	12.0	---	---			15.5	14.0
31	---	---	16.0	15.0	---	---	---	---			---	---
MONTH					17.0	12.0	17.5	11.0			22.0	12.5

04144500 SHIAWASSEE RIVER AT OWOSSO, MI

LOCATION.--Lat 43°00'54", long 84°10'52", in SW¼ sec.12, T.7 N., R.2 E., Shiawassee County, Hydrologic Unit 04080203, on right bank on grounds of sewage-treatment plant, 1.5 mi (2.4 km) north of Owosso.

DRAINAGE AREA.--538 mi² (1,393 km²).

PERIOD OF RECORD.--March 1931 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height record for flood seasons collected in this vicinity 1904, 1910-30 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1307: 1949(M). WSP 1337: 1932, 1934, 1936-38, 1944.

GAGE.--Water-stage recorder. Datum of gage is 707.25 ft (215.570 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 15, 1933, at site 1.5 mi (2.4 km) upstream at datum 5.46 ft (1.664 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Flow regulated below about 800 ft³/s (22.7 m³/s) by powerplant at Shiawasseetown prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 327 ft³/s (9.261 m³/s), 8.25 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,240 ft³/s (177 m³/s) Apr. 6, 1947, gage height, 10.35 ft (3.155 m); minimum, 0.2 ft³/s (0.006 m³/s) July 27, 1934, gage height, 1.12 ft (0.341 m); minimum daily, 2.0 ft³/s (0.057 m³/s) July 28, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,490 ft³/s (42.2 m³/s) Apr. 4, gage height, 5.42 ft (1.652 m); no peak above base of 1,500 ft³/s (42.5 m³/s); minimum, 48 ft³/s (1.36 m³/s) Oct. 3, 4, 5; minimum gage height, 2.21 ft (0.674 m) Feb. 14, 15.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	52	116	298	460	150	240	876	568	223	146	127	164
2	50	104	260	428	145	220	861	566	232	137	117	229
3	49	103	268	370	140	210	923	530	263	126	104	271
4	50	103	245	310	135	200	1400	491	290	115	139	254
5	66	117	326	290	130	200	1370	452	311	120	236	190
6	75	123	334	270	120	200	1210	417	379	99	260	157
7	50	120	319	250	115	200	1200	382	497	102	231	124
8	56	125	294	250	110	200	1220	357	614	110	200	106
9	57	130	286	300	110	200	1390	336	590	91	173	143
10	57	136	270	350	115	200	1430	313	486	90	155	109
11	60	133	258	400	120	200	1320	291	469	89	142	100
12	61	135	260	450	120	210	1210	253	411	103	146	121
13	60	137	250	400	120	210	1040	226	354	97	179	125
14	61	133	245	370	120	215	942	263	319	100	191	125
15	61	142	240	350	120	220	1230	294	292	117	200	165
16	62	136	230	350	130	250	1160	306	277	123	184	239
17	59	133	190	350	135	400	1080	319	263	109	173	370
18	60	134	180	350	140	500	1050	548	262	104	152	427
19	61	139	185	340	150	800	989	661	284	98	123	411
20	61	141	200	320	160	1100	842	649	271	92	144	395
21	63	176	220	300	170	1260	655	646	254	111	138	350
22	71	173	245	280	200	1280	532	611	249	94	171	361
23	92	162	251	250	350	1230	474	534	236	82	192	452
24	96	158	371	210	450	1180	449	472	223	74	162	414
25	118	176	739	200	520	1180	493	560	205	70	170	393
26	161	220	763	190	450	1060	472	539	184	68	150	385
27	173	227	681	185	350	991	443	436	165	205	136	401
28	168	267	660	180	270	928	459	382	153	155	128	438
29	141	294	648	170	255	790	487	325	154	152	117	367
30	123	298	593	160	---	701	531	267	152	147	104	319
31	114	---	512	155	---	755	---	230	---	152	116	---
TOTAL	2488	4695	10831	9238	5600	17530	27768	13224	9062	3478	4960	8105
MEAN	80.3	157	349	298	193	565	926	427	302	112	160	270
MAX	173	298	763	460	520	1280	1430	661	614	205	260	452
MIN	49	103	180	155	110	200	443	226	152	68	104	100
CFSM	.15	.29	.65	.55	.36	1.05	1.72	.79	.56	.21	.30	.50
IN.	.17	.32	.75	.64	.39	1.21	1.92	.91	.63	.24	.34	.56

CAL YR 1979 TOTAL 99089 MEAN 271 MAX 1680 MIN 49 CFSM .50 IN 6.85
WTR YR 1980 TOTAL 116979 MEAN 320 MAX 1430 MIN 49 CFSM .60 IN 8.09

04145000 SHIAWASSEE RIVER NEAR FERGUS, MI

LOCATION.--Lat 43°15'17", long 84°06'20", in sec.22, T.10 N., R.3 E., Saginaw County, Hydrologic Unit 04080203, on right bank at downstream side of county highway bridge, 1.2 mi (1.9 km) east of Fergus, 1.8 mi (2.9 km) upstream from Bear Creek, and 14 mi (22 km) above mouth.

DRAINAGE AREA.--637 mi² (1,650 km²).

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1940(M), 1941-42, 1943(M), 1944, 1945(M), 1946, 1947(M), 1948, 1950. WSP 1627: 1952, 1954(M), 1957.

GAGE.--Water-stage recorder. Datum of gage is 585.80 ft (178.552 m) National Geodetic Vertical Datum of 1929. Prior to Aug. 22, 1968, nonrecording gage at same site and datum. Prior to Oct. 1, 1970, at datum 2.00 ft (0.610 m) higher.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation at low stages by powerplant above Owosso prior to February 1953; occasional regulation at low stages since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 413 ft³/s (11.70 m³/s), 8.80 in/yr (224 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,500 ft³/s (212 m³/s) Apr. 6, 1947 (includes overflow bypassing gage); maximum gage height, 15.44 ft (4.706 m), present datum, Mar. 29, 1960; minimum discharge, 27 ft³/s (0.76 m³/s) Aug. 8, 1966; minimum gage height, 1.60 ft (0.488 m) July 25, 26, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,630 ft³/s (46.2 m³/s) Apr. 5, gage height, 7.18 ft (2.188 m); maximum gage height, 9.01 ft (2.746 m), Mar. 20, backwater from ice; minimum discharge, 67 ft³/s (1.90 m³/s) Oct. 1; minimum gage height, 1.83 ft (0.558 m) Oct. 1-6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	67	133	329	494	160	270	911	686	293	154	247	134
2	68	137	324	430	150	250	923	683	291	148	186	167
3	68	130	353	430	145	230	920	650	315	139	167	211
4	68	127	378	380	140	220	1340	605	327	133	147	239
5	69	124	343	350	140	220	1570	554	345	130	160	225
6	74	133	385	320	140	220	1340	506	398	130	237	184
7	93	146	357	300	140	220	1260	464	524	116	251	160
8	72	139	341	310	140	220	1270	433	716	173	239	140
9	71	142	321	350	140	220	1440	408	734	142	225	134
10	72	153	319	400	140	220	1530	385	629	121	195	158
11	73	155	289	540	140	220	1460	363	551	113	184	133
12	73	157	281	540	140	230	1370	339	524	116	172	124
13	75	157	309	490	140	230	1240	327	446	153	166	137
14	76	164	293	450	140	230	1070	311	398	120	186	144
15	76	160	283	430	140	230	1440	345	368	113	195	137
16	76	169	343	420	140	250	1400	347	339	124	198	161
17	78	161	325	410	140	450	1220	353	321	134	189	301
18	79	158	147	400	150	900	1150	620	295	133	182	373
19	76	160	271	400	160	1000	1100	818	305	116	166	405
20	79	170	277	370	180	1100	1000	776	331	110	150	383
21	80	190	327	350	190	1200	842	749	305	127	164	365
22	79	200	344	350	210	1300	701	731	285	138	155	337
23	93	190	329	300	350	1280	605	674	273	166	173	515
24	111	180	337	220	520	1210	527	590	255	130	194	512
25	108	200	578	210	500	1210	605	551	235	108	190	428
26	121	240	830	200	450	1140	611	671	213	105	170	413
27	155	260	728	190	400	1040	572	566	194	418	160	398
28	170	290	671	185	350	980	557	491	179	629	150	408
29	173	300	653	180	300	908	596	438	164	307	145	435
30	153	310	629	170	---	800	665	378	158	243	138	365
31	140	---	575	165	---	776	---	333	---	227	129	---
TOTAL	2866	5335	12369	10734	6175	18974	31235	16145	10711	5216	5610	8226
MEAN	92.5	178	399	346	213	612	1041	521	357	168	181	274
MAX	173	310	830	540	520	1300	1570	818	734	629	251	515
MIN	67	124	147	165	140	220	527	311	158	105	129	124
CFSM	.15	.28	.63	.54	.33	.96	1.63	.82	.56	.26	.28	.43
IN.	.17	.31	.72	.63	.36	1.11	1.82	.94	.63	.30	.33	.48

CAL YR 1979 TOTAL 117300 MEAN 321 MAX 1900 MIN 67 CFSM .50 IN 6.85
WTR YR 1980 TOTAL 133596 MEAN 365 MAX 1570 MIN 67 CFSM .57 IN 7.80

04146000 FARMERS CREEK NEAR LAPEER, MI

LOCATION.--Lat 43°02'41", long 83°20'14", in sec.6, T.7 N., R.10 E., Lapeer County, Hydrologic Unit 04080204, on left bank at sewage-treatment plant at Michigan Home and Training School, 2.0 mi (3.2 km) west of Lapeer.

DRAINAGE AREA.--55.3 mi^2 (143.2 km^2).

PERIOD OF RECORD.--October 1932 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 924: 1940. WSP 1084: 1942(M), 1943. WSP 1337: 1934-38, 1940(M), 1944(M), 1945, 1946(M), 1948-51(M). WSP 1727: 1952(M). WDR MI-78: Drainage area.

GAGE.--Water-stage recorder and concrete control. Datum of gage is 805.79 ft (245.605 m) National Geodetic Vertical Datum of 1929. Prior to May 25, 1954, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Prior to 1941, occasional regulation by dam above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--48 years, 29.9 ft^3/s (0.847 m^3/s), 7.34 in/yr (186 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,280 ft^3/s (36.2 m^3/s) Apr. 6, 1947, gage height, 19.87 ft (6.056 m), from floodmark, from rating curve extended above 660 ft^3/s (18.7 m^3/s) on basis of contracted-opening measurement of peak flow; minimum not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 169 ft^3/s (4.79 ft^3/s) Apr. 6, gage height, 16.70 ft (5.090 m), only peak above base of 160 ft^3/s (4.53 m^3/s); minimum, 2.7 ft^3/s (0.076 m^3/s) Oct. 1, gage height, 15.06 ft (4.590 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.7	41	47	57	14	16	74	60	17	7.5	39	11
2	3.3	39	40	47	13	15	77	74	17	6.9	36	11
3	4.1	35	36	42	12	14	80	54	18	6.5	35	11
4	4.4	29	33	36	11	14	102	54	18	5.9	30	11
5	4.7	26	31	32	11	16	115	45	18	5.6	27	9.7
6	5.0	22	31	30	11	15	157	38	20	4.4	34	9.3
7	4.7	22	30	29	11	15	165	33	22	3.8	31	8.6
8	4.4	21	30	28	10	15	147	29	26	5.9	29	8.2
9	4.7	21	29	28	9.7	15	134	26	26	6.9	28	8.6
10	5.0	22	28	27	9.3	16	119	24	26	7.9	26	8.9
11	5.0	22	24	27	9.0	14	113	22	26	10	28	8.9
12	5.0	21	31	27	8.9	15	109	21	24	11	32	8.2
13	5.3	21	29	33	9.0	15	106	24	22	11	27	12
14	5.6	20	27	33	9.5	15	109	29	20	11	23	17
15	5.6	22	25	33	9.7	15	113	28	19	10	20	16
16	5.9	22	25	31	9.7	17	122	29	17	11	17	15
17	6.2	22	18	32	10	46	147	30	16	10	16	35
18	6.9	22	22	32	11	60	148	39	15	9.3	15	37
19	8.2	22	20	31	11	84	131	41	14	8.6	14	35
20	8.6	22	20	31	11	108	115	39	16	8.2	13	36
21	8.9	22	19	30	12	111	100	39	16	7.5	17	33
22	11	26	20	29	20	104	87	40	16	8.2	18	38
23	12	33	23	27	26	95	73	39	15	9.7	16	57
24	13	42	32	23	31	89	63	36	13	10	15	48
25	13	66	57	22	28	85	57	32	12	10	14	42
26	13	77	65	21	25	85	53	28	11	9.3	13	36
27	13	87	84	20	20	88	41	25	11	16	12	31
28	13	84	95	19	17	87	38	22	10	26	11	26
29	14	70	92	18	17	83	35	19	9.3	30	11	22
30	26	57	79	17	---	79	45	17	8.2	33	11	20
31	34	---	69	16	---	79	---	17	---	36	10	---
TOTAL	276.2	1034	1215	908	406.8	1525	2979	1063	518.5	357.1	668	670.4
MEAN	8.91	34.5	39.2	29.3	14.0	49.2	99.3	34.3	17.3	11.5	21.5	22.3
MAX	34	87	95	57	31	111	165	74	26	36	39	57
MIN	2.7	20	18	16	8.9	14	35	17	8.2	3.8	10	8.2
CFSM	.16	.63	.71	.53	.25	.89	1.80	.62	.31	.21	.39	.40
IN.	.19	.70	.82	.61	.27	1.03	2.00	.72	.35	.24	.45	.45

CAL YR 1979 TOTAL 9139.7 MEAN 25.0 MAX 174 MIN 2.3 CFSM .45 IN 6.15
WTR YR 1980 TOTAL 11625.0 MEAN 31.8 MAX 165 MIN 2.7 CFSM .58 IN 7.82

04146063 SOUTH BRANCH FLINT RIVER NEAR COLUMBIAVILLE, MI

LOCATION.--Lat 43°09'34", long 83°21'03", in NE¼ NE¼ sec. 36, T.9 N., R.9 E., Lapeer County, Hydrologic Unit 04080204, on right bank at upstream side of bridge on Columbiaville Road, 3.0 miles (4.8 km) east of Columbiaville, and 3.2 miles (5.1 km) upstream from confluence of North and South Branches.

DRAINAGE AREA.--220 mi² (570 km²).

PERIOD OF RECORD.--March to September 1980.

GAGE.--Water-stage recorder. Altitude of gage is 765 ft (233 m), from topographic map.

REMARKS.--Records good except those for period of no gage-height record, Mar. 27 to Apr. 20, which are fair. Several observations of water temperature were made during the period.

Discharge measurements made prior to period of record are as follows:

Date	Discharge (ft³/s)	Discharge (m³/s)
Oct. 4, 1971	23.3	0.66
July 22, 1974	53.5	1.52
Oct. 11, 1979	32.7	0.93
Nov. 8, 1979	52.5	1.49
Nov. 28, 1979	252	7.14
Jan. 3, 1980	165	4.67
Feb. 5, 1980	47.2	1.34

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge during period March to September, 1,000 ft³/s (28.3 m³/s) Apr. 6; maximum gage height recorded, 6.01 ft (1.832 m) Mar. 18, backwater from ice; minimum discharge, 24 ft³/s (6.80 m³/s) July 8; minimum gage height, 1.61 ft (0.491 m) July 7, 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						95	300	293	86	40	245	90
2						80	310	288	90	38	189	103
3						70	400	266	105	34	157	106
4						60	550	217	117	30	137	94
5						60	800	188	105	31	119	93
6						61	1000	165	116	33	235	87
7						62	850	149	144	26	238	70
8						64	750	139	203	51	184	64
9						67	650	129	178	69	169	63
10						69	550	118	165	73	147	74
11						72	500	113	150	73	128	70
12						74	470	111	132	88	169	64
13						78	460	125	115	97	163	72
14						84	460	183	103	74	131	185
15						91	580	180	98	60	116	196
16						103	800	162	92	62	100	141
17						296	950	153	85	60	87	225
18						959	750	231	82	47	80	477
19						845	580	266	78	48	72	441
20						567	450	237	95	44	65	271
21						594	350	214	101	35	94	196
22						553	300	193	93	32	180	180
23						465	260	169	81	55	159	437
24						413	225	149	71	49	128	645
25						411	213	133	65	43	109	619
26						340	199	122	58	32	105	347
27						330	187	108	53	89	92	197
28						320	204	96	52	240	61	168
29						300	234	90	52	303	54	155
30						300	272	87	45	219	77	136
31						300	---	91	---	197	102	---
TOTAL	---	---	---	---	---	8183	14604	5165	3010	2372	4092	6066
MEAN	---	---	---	---	---	264	487	167	100	76.5	132	202
MAX	---	---	---	---	---	959	1000	293	203	303	245	645
MIN	---	---	---	---	---	60	187	87	45	26	54	63
CFSM	---	---	---	---	---	1.20	2.20	.76	.45	.35	.60	.91
IN.	---	---	---	---	---	1.34	2.46	.87	.51	.40	.69	1.02

04147000 HOLLOWAY RESERVOIR NEAR OTISVILLE, MI

LOCATION.--Lat 43°07'15", long 83°29'45", in NW¼ sec.11, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, in gatehouse on right side of Holloway Dam on Flint River, 3.5 mi (5.6 km) southeast of Otisville.

DRAINAGE AREA.--526 mi^2 (1,362 km^2).

PERIOD OF RECORD.--March 1954 to current year.

REVISED RECORDS.--WSP 2111: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is National Geodetic Vertical Datum of 1929 (levels by city of Flint).

REMARKS.--Reservoir is formed by an earth-fill dam with concrete spillway completed in 1953. Capacity of reservoir, 1,256,000,000 cu ft (35.6 hm^3) at elevation 760.00 ft (231.65 m). The spillway section includes two 90 foot (27.4 m) drum gates with minimum crest elevation of 751 ft (228.9 m), maximum at 755 ft (230.1 m), three 20-foot (6.1 m) radial gates with sill elevation of 745 ft (227.1 m), and 2 sluices (each 4 by 6 ft), one on each side with valve controls. Entrance elevation of sluiceways is 724 ft (220.7 m). Reservoir is used to regulate flow for sewage dilution for city of Flint.

COOPERATION.--Reservoir elevations furnished by city of Flint.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 996,000,000 cu ft (28.2 hm^3) Mar. 8, 1956, elevation, 757.4 ft (230.86 m); minimum, reservoir empty at times during October, November, 1954, January, February, 1955, October, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum contents, 815,000,000 cu ft (23.1 hm^3) Aug. 2, 3, elevation, 755.50 ft (230.28 m); minimum, 415,000,000 cu ft (11.8 hm^3) Oct. 16, elevation, 750.03 ft (228.61 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Date	Elevation (feet)	Contents (millions of cubic feet)	Change in contents during month	
			Millions of cubic feet	Equivalent in ft^3/s
Sept. 30	753.42	641	--	--
Oct. 31	752.44	568	-73	-27.3
Nov. 30	752.45	568	0	0
Dec. 31	752.25	554	-14	-5.2
CAL YR 1979	--	--	+63	+2.0
Jan. 31	751.61	510	-44	-16.4
Feb. 29	751.68	515	+5	+2.0
Mar. 31	752.32	559	+44	+16.4
Apr. 30	752.23	553	-6	-2.3
May 31	755.14	783	+230	+85.9
June 30	755.01	771	-12	-4.6
July 31	755.30	797	+26	+9.7
Aug. 31	755.06	775	-22	-8.2
Sept. 30	755.13	782	+7	+2.7
WTR YR 1980	--	--	+141	+4.5

04147500 FLINT RIVER NEAR OTISVILLE, MI

LOCATION.--Lat 43°06'40", long 83°31'10", in SE¼ sec.9, T.8 N., R.8 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 15, 1.5 mi (2.4 km) downstream from Holloway Reservoir, 3.5 mi (5.6 km) upstream from Powers-Cullen drain, and 3.8 mi (6.1 km) south of Otisville.

DRAINAGE AREA.--530 mi² (1,373 km²).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 721.39 ft (219.880 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Flow regulated by Holloway Reservoir, 1.5 mi (2.4 km) above station (see preceding page). Several observations of water temperature were made during the year. City of Flint gage-height telemark at station.

AVERAGE DISCHARGE.--28 years, 292 ft³/s (8.269 m³/s), 7.48 in/yr (190 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,150 ft³/s (174 m³/s) Apr. 1, 1960, gage height, 14.97 ft (4.563 m); minimum, 2.1 ft³/s (0.059 m³/s) Oct. 11, 12, 1971, gage height, 1.57 ft (0.479 m).

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,420 ft³/s (40.2 m³/s) Apr. 18, gage height, 9.21 ft (2.807 m); minimum, 8.0 ft³/s (0.23 m³/s) Oct. 19, gage height, 1.87 ft (0.570 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	95	400	627	144	177	711	188	215	127	549	151
2	16	86	375	545	135	163	715	189	199	128	592	167
3	16	104	455	473	128	151	718	190	228	117	559	177
4	15	156	575	417	121	142	818	191	231	112	514	168
5	76	125	503	361	117	140	947	192	231	109	429	158
6	188	105	220	314	114	136	1090	193	250	108	391	148
7	188	125	73	283	110	135	1160	196	304	96	416	135
8	188	135	156	255	110	137	1170	212	348	125	408	124
9	187	133	202	237	110	136	1110	223	376	130	381	127
10	241	129	221	226	109	135	1050	226	373	133	339	125
11	333	123	215	256	109	140	995	226	359	133	295	119
12	332	123	245	287	108	144	944	227	336	143	276	125
13	331	121	242	302	107	150	912	251	303	143	272	140
14	328	118	236	316	106	149	926	258	288	130	246	159
15	163	119	227	317	110	147	1060	288	269	124	224	187
16	9.8	118	218	312	112	151	1240	334	232	127	199	187
17	9.2	116	186	318	112	284	1370	351	202	116	177	320
18	8.3	117	155	325	110	546	1400	429	196	104	151	447
19	8.9	116	170	332	108	790	1280	511	191	100	145	567
20	9.4	115	170	328	109	1020	1130	493	189	93	144	541
21	9.1	122	160	297	115	1170	953	458	194	88	166	492
22	9.1	131	153	292	142	1120	827	469	192	92	194	518
23	9.7	151	186	266	176	1010	732	456	189	93	202	851
24	10	182	268	211	216	903	651	412	181	93	189	932
25	140	217	479	201	243	827	574	372	165	92	169	901
26	267	318	669	202	245	786	527	309	152	102	149	858
27	176	410	787	198	236	741	489	268	152	171	138	783
28	95	421	865	186	219	663	359	248	140	245	131	706
29	94	417	885	173	199	658	185	226	125	333	120	606
30	93	409	825	161	---	694	188	202	127	398	120	524
31	93	---	723	153	---	787	---	194	---	489	131	---
TOTAL	3656.5	5157	11254	9171	4078	14272	26231	8982	6937	4594	8416	11443
MEAN	118	172	363	296	141	460	874	290	231	148	271	381
MAX	333	421	885	627	245	1170	1400	511	376	489	592	932
MIN	8.3	86	73	153	106	135	185	188	125	88	120	119
MEAN+	90.7	172	358	279	143	477	872	376	227	158	263	384
CFSM+	.17	.32	.68	.53	.27	.90	1.65	.71	.43	.30	.50	.72
IN+	.20	.36	.78	.61	.29	1.04	1.84	.82	.48	.34	.57	.81

CAL YR 1979 TOTAL 89029.5 MEAN 244 MAX 1690 MIN 4.3 MEAN+ 246 CFSM+ .46 IN+ 6.31
WTR YR 1980 TOTAL 114191.5 MEAN 312 MAX 1400 MIN 8.3 MEAN+ 316 CFSM+ .60 IN+ 8.14

+ Adjusted for change in contents in Holloway Reservoir.

04147990 BUTTERNUT CREEK NEAR GENESEE, MI

LOCATION.--Lat 43°08'09", long 83°35'57", in NE¼ NE¼ sec.2, T.8 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Frances Road, 2.3 mi (3.7 km) upstream from mouth, and 2.0 mi (3.2 km) northeast of Genesee.

DRAINAGE AREA.--34.7 mi² (89.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 730 ft (223 m) from topographic map (nearest 10 ft). Prior to June 11, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period and those for periods of no gage-height record, Nov. 2 to Dec. 3 and Mar. 30 to May 5, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 20.4 ft³/s (0.578 m³/s), 7.98 in/yr (203 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 533 ft³/s (15.1 m³/s) May 17, 1974, gage height, 8.21 ft (2.502 m); maximum gage height, 8.68 ft (2.646 m) Dec. 31, 1972; minimum discharge, 1.2 ft³/s (0.034 m³/s) Dec. 1, 1971, result of freezeup, Oct. 3, 1978; minimum gage height, 1.48 ft (0.451 m) July 23, 27, 28, 1977.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 170 ft³/s (4.81 m³/s) Sept. 23, gage height, 6.27 ft (1.911 m), no peak above base of 200 ft³/s (5.66 m³/s); maximum gage height, 7.65 ft (2.332 m) Mar. 17, backwater from ice; minimum discharge, 2.0 ft³/s (0.057 m³/s) Oct. 1, 2; minimum gage height, 1.54 ft (0.469 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.1	2.3	4.5	11	3.5	7.0	42	50	7.7	4.6	32	10
2	2.2	5.0	5.0	10	3.0	6.5	48	25	7.7	4.6	16	12
3	2.4	4.0	4.5	9.1	3.0	6.0	60	22	8.0	4.4	12	11
4	2.4	3.0	4.5	9.0	3.0	5.5	120	20	8.7	4.2	9.3	7.6
5	2.4	2.5	4.2	8.5	3.0	5.5	100	17	8.5	4.1	7.4	6.6
6	2.4	2.5	5.6	8.5	3.0	5.5	95	15	18	4.0	6.7	5.6
7	2.3	2.5	5.2	8.5	3.0	5.5	90	14	29	4.0	6.0	4.9
8	2.4	3.0	5.0	8.0	2.5	5.5	84	13	34	4.3	5.6	4.3
9	2.5	3.5	6.5	7.5	2.5	5.5	80	12	21	4.7	5.9	5.3
10	2.4	4.5	4.3	7.0	2.5	5.5	75	11	18	4.8	5.7	5.5
11	2.3	5.5	4.3	9.5	2.5	5.3	72	10	14	4.7	5.4	4.5
12	2.3	4.0	6.1	9.0	2.5	5.3	70	9.6	11	4.5	5.3	4.2
13	2.3	3.0	5.8	8.0	2.5	5.5	68	13	9.4	4.4	5.1	5.5
14	2.3	3.0	5.5	8.0	2.5	6.0	85	24	9.3	4.3	4.9	6.0
15	2.3	3.0	5.0	7.5	2.5	8.0	110	19	9.7	4.2	4.7	5.2
16	2.2	6.0	4.5	7.5	2.5	30	100	16	8.7	4.0	4.4	4.8
17	2.2	5.0	4.5	8.5	2.5	95	75	16	8.0	4.0	4.2	59
18	2.2	3.5	4.5	9.0	2.5	60	55	67	7.1	3.9	4.1	36
19	2.9	3.0	4.5	8.5	2.5	50	40	46	6.3	3.9	3.9	19
20	2.8	3.0	4.5	8.5	3.0	48	32	36	8.4	3.7	3.9	14
21	2.7	3.5	4.5	7.5	6.0	48	25	29	10	3.6	16	12
22	2.6	4.5	4.8	6.5	8.5	42	21	22	8.3	3.7	11	29
23	2.8	6.0	9.2	6.0	12	37	19	17	6.5	3.6	7.1	122
24	2.9	7.5	36	5.5	11	34	18	14	5.9	3.6	5.9	46
25	2.9	7.0	86	5.0	10	31	18	12	5.5	3.4	4.9	30
26	2.4	6.5	41	4.5	10	35	17	10	5.2	3.5	4.6	24
27	2.3	8.0	26	4.5	9.5	44	20	9.2	5.0	15	4.1	19
28	2.2	7.0	20	4.0	8.0	41	35	8.4	4.9	11	3.7	16
29	2.2	9.5	17	4.0	7.5	37	60	8.2	4.8	7.7	3.6	13
30	2.2	6.0	15	3.5	---	38	68	7.9	4.7	15	19	12
31	2.2	---	13	3.5	---	40	---	7.8	---	33	11	---
TOTAL	74.7	137.3	371.0	225.6	137.0	798.1	1802	601.1	313.3	188.4	243.4	554.0
MEAN	2.41	4.58	12.0	7.28	4.72	25.7	60.1	19.4	10.4	6.08	7.85	18.5
MAX	2.9	9.5	86	11	12	95	120	67	34	33	32	122
MIN	2.1	2.3	4.2	3.5	2.5	5.3	17	7.8	4.7	3.4	3.6	4.2
CFSM	.07	.13	.35	.21	.14	.74	1.73	.56	.30	.18	.23	.53
IN.	.08	.15	.40	.24	.15	.86	1.93	.64	.34	.20	.26	.59

CAL YR 1979 TOTAL 3902.7 MEAN 10.7 MAX 220 MIN 1.9 CFSM .31 IN 4.18
WTR YR 1980 TOTAL 5445.9 MEAN 14.9 MAX 122 MIN 2.1 CFSM .43 IN 5.84

04148140 KEARSLEY CREEK NEAR DAVISON, MI

LOCATION.--Lat 43°02'01", long 83°34'53", in NE¼ sec.12, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) upstream from bridge on State Highway 21, 1.4 mi (2.3 km) downstream from Black Creek, and 3.3 mi (5.3 km) west of Davison.

DRAINAGE AREA.--99.4 mi² (257.4 km²).

PERIOD OF RECORD.--October 1965 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.39 ft (227.804 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Some diurnal fluctuation caused by small dams, and occasional diversion for sprinkler irrigation above station. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--15 years, 68.1 ft³/s (1.929 m³/s), 9.30 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,430 ft³/s (40.5 m³/s) Apr. 21, 1975, gage height, 11.32 ft (3.450 m); minimum, 2.5 ft³/s (0.071 m³/s) Sept. 10, 1978; minimum gage height, 2.69 ft (0.820 m) Sept. 12, 1969.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 350 ft³/s (9.91 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 18	0100	*461	13.1	*8.49	2.588	Apr. 15	0200	412	11.7	7.96	2.426
Apr. 4	1000	368	10.4	7.60	2.316						

Minimum discharge, 4.8 ft³/s (0.136 m³/s) Oct. 1, gage height, 2.94 ft (0.896 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	5.5	18	42	86	17	40	136	141	37	13	31	16
2	7.6	17	38	67	16	35	129	138	36	13	25	17
3	8.8	18	36	60	15	31	144	127	47	12	26	16
4	7.7	20	40	50	15	31	332	109	42	11	26	15
5	9.2	21	41	50	15	31	271	96	42	15	46	14
6	10	21	44	47	14	31	273	83	55	13	77	12
7	9.5	34	45	45	14	31	270	66	66	13	32	11
8	9.8	35	46	43	14	31	240	63	68	41	36	10
9	12	26	46	40	13	31	243	60	57	46	37	15
10	10	21	51	37	13	30	221	57	56	61	32	12
11	11	14	43	52	13	30	198	56	50	51	37	11
12	12	13	51	50	13	30	196	53	45	31	57	12
13	12	19	48	45	13	30	183	69	40	27	39	23
14	12	22	45	42	13	30	233	79	38	24	35	24
15	12	26	41	40	13	35	362	71	34	22	29	21
16	12	27	39	40	13	70	328	80	31	22	20	19
17	12	28	38	45	13	250	308	89	38	19	15	151
18	12	32	38	48	13	350	280	181	31	17	15	108
19	15	33	38	48	14	270	205	152	30	16	14	89
20	15	35	38	45	16	280	169	137	33	13	18	88
21	14	38	38	40	30	286	141	132	30	15	38	61
22	13	42	40	35	50	262	120	129	35	16	32	92
23	16	50	47	32	65	222	103	102	34	16	29	287
24	15	58	85	28	60	213	89	73	29	14	38	182
25	14	58	203	27	55	196	99	59	18	13	34	141
26	15	73	147	25	55	160	92	52	12	12	25	79
27	15	83	176	23	50	149	85	36	11	58	19	66
28	16	95	169	22	45	142	112	30	14	54	17	59
29	15	86	152	21	42	122	164	30	15	40	17	45
30	14	67	126	20	---	121	184	42	14	35	11	39
31	14	---	107	18	---	131	---	49	---	32	11	---
TOTAL	376.1	1130	2190	1271	732	3681	5914	2641	1088	785	918	1723
MEAN	12.1	37.7	70.3	41.0	25.2	119	197	85.2	36.3	25.3	29.6	57.4
MAX	16	95	203	86	65	350	362	181	68	61	77	287
MIN	5.5	13	38	18	13	30	85	30	11	11	11	10
CFSM	.12	.38	.71	.41	.25	1.20	1.98	.86	.37	.26	.30	.58
IN.	.14	.42	.82	.48	.27	1.38	2.21	.99	.41	.29	.34	.64

CAL YR 1979 TOTAL 17979.0 MEAN 49.3 MAX 400 MIN 5.3 CFSM .50 IN 6.73
WTR YR 1980 TOTAL 22443.1 MEAN 61.3 MAX 362 MIN 5.5 CFSM .62 IN 8.40

04148160 GILKEY CREEK NEAR FLINT, MI

LOCATION.--Lat 43°01'27", long 83°37'32", in NE¼ SW¼ sec.10, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on right bank 25 ft (8 m) downstream from culvert on extension of Arapaho Street, 5.1 mi (8.2 km) upstream from mouth, and 3.5 mi (5.6 km) east of Flint.

DRAINAGE AREA.--6.43 mi² (16.65 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 747.56 ft (227.856 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records fair except those for the winter period and those below 1.0 ft³/s (0.028 m³/s), which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 4.52 ft³/s (0.128 m³/s), 9.55 in/yr (243 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 285 ft³/s (8.07 m³/s) Apr. 19, 1975, gage height, 7.66 ft (2.335 m); no flow on many days during 1970, 1973-80.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*).

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Apr. 4	0200	96	2.72	3.83	1.167	Sept. 17	1000	87	2.46	3.71	1.131
Apr. 14	2000	96	2.72	3.84	1.170	Sept. 22	2200	*156	4.42	*5.32	1.622

No flow on several days in October.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.00	.05	.69	1.1	.55	.65	11	9.4	.86	.12	.83	.76
2	.02	.37	.45	.90	.55	.65	7.2	5.7	.89	.10	.48	.85
3	.02	.14	.24	.80	.55	.65	15	3.7	4.5	.09	.70	.63
4	.08	.06	.26	.80	.55	.65	67	2.8	1.0	.09	.47	.29
5	.07	.04	.71	.80	.55	.65	24	2.3	.75	.55	1.2	.17
6	.15	.04	1.2	.80	.55	.60	12	1.9	2.6	.42	8.6	.13
7	.10	.07	.88	.90	.55	.60	7.5	1.5	8.7	.13	.79	.11
8	.05	.13	.80	.75	.55	.60	8.2	1.4	4.9	22	14	.10
9	.29	.19	.40	.75	.55	.60	15	1.3	1.1	2.5	4.4	.62
10	.22	.68	.30	.60	.55	.60	12	1.1	1.0	.81	.94	1.1
11	.07	.35	.36	5.0	.55	.65	7.2	1.1	.75	.59	4.4	1.1
12	.07	.09	2.6	6.0	.55	.65	7.9	1.0	.63	.58	11	1.1
13	.09	.06	1.1	2.5	.55	.65	5.5	12	.58	.60	1.4	4.8
14	.08	.04	.72	1.0	.55	.70	38	11	.64	.31	.72	2.6
15	.06	.24	.43	.90	.55	1.0	51	2.7	.67	.28	.55	1.4
16	.04	.86	.31	.80	.55	6.0	27	1.5	.55	.96	.42	1.4
17	.03	.32	.26	.70	.55	50	12	9.4	.43	.60	.34	57
18	.04	.09	.13	.65	.55	35	7.7	42	.36	.27	.32	18
19	.18	.08	.21	.65	.60	22	5.1	16	1.6	.20	.25	4.5
20	.45	.07	.21	.60	2.5	15	4.3	6.5	2.1	.17	.59	1.9
21	.13	.96	.23	.60	7.0	15	3.5	3.3	.55	.46	18	2.5
22	.03	3.6	.93	.60	22	12	3.2	2.0	.37	.82	6.1	38
23	.08	5.6	1.9	.60	10	9.7	2.4	1.5	.24	1.4	.67	69
24	.13	4.2	19	.55	4.0	17	2.3	1.2	.21	.35	.46	18
25	.04	.92	40	.55	1.5	17	4.4	1.0	.17	.17	.37	6.1
26	.00	3.8	14	.55	.90	10	2.8	.90	.16	.21	.29	3.4
27	.00	1.0	4.7	.55	.80	9.0	2.4	.80	.49	29	.23	2.2
28	.00	2.2	2.7	.55	.70	8.9	11	.72	.27	3.1	.18	2.0
29	.00	1.1	2.0	.55	.65	6.6	15	.68	.20	.79	.15	2.9
30	.00	.81	1.7	.55	---	5.1	18	.74	.12	.59	.43	3.1
31	.00	---	1.4	.55	---	13	---	2.1	---	.74	.34	---
TOTAL	2.52	28.13	100.82	33.10	60.55	261.20	409.6	149.24	37.39	69.08	79.52	245.76
MEAN	.081	.94	3.25	1.07	2.09	8.43	13.7	4.81	1.25	2.23	2.57	8.19
MAX	.45	5.6	40	6.0	22	50	67	42	8.7	29	18	69
MIN	.00	.04	.13	.55	.55	.60	2.3	.68	.12	.09	.15	.10
CFSM	.01	.15	.51	.17	.33	1.31	2.13	.75	.19	.35	.40	1.27
IN.	.01	.16	.58	.19	.35	1.51	2.37	.86	.22	.40	.46	1.42

CAL YR 1979 TOTAL 775.53 MEAN 2.12 MAX 90 MIN .00 CFSM .33 IN 4.49
WTR YR 1980 TOTAL 1476.83 MEAN 4.04 MAX 69 MIN .00 CFSM .63 IN 8.54

04148300 SWARTZ CREEK AT FLINT, MI

LOCATION.--Lat 42°59'16", long 83°43'57", in NW¼ sec.26, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on right bank 6 ft (2 m) downstream from bridge on South Ballenger Highway, in Flint, 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--115 mi^2 (298 km^2).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-75: 1971-73.

GAGE.--Water-stage recorder. Datum of gage is 727.05 ft (221.605 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 4, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--10 years, 78.1 ft^3/s (2.212 m^3/s), 9.22 in/yr (234 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,160 ft^3/s (89.5 m^3/s) Apr. 19, 1975, gage height, 9.02 ft (2.749 m); minimum, 0.01 ft^3/s (<0.001 m^3/s) Sept. 9, 1978; minimum gage height, 1.16 ft (0.354 m) Aug. 19, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 744 ft^3/s (21.1 m^3/s) Apr. 4; maximum gage height, 6.74 ft (2.054 m) Mar. 17, backwater from ice, no peak above base of 800 ft^3/s (22.7 m^3/s); minimum discharge, 1.2 ft^3/s (0.034 m^3/s) Oct. 1, 5, 6, 7, gage height, 1.43 ft (0.436 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.3	10	30	71	18	25	245	163	58	13	17	16
2	3.2	4.5	31	60	17	20	193	131	53	11	19	18
3	1.6	3.5	30	63	16	19	230	112	74	9.9	18	11
4	6.9	2.7	26	60	15	18	652	99	60	9.0	15	8.1
5	2.4	2.5	33	55	14	18	440	90	52	16	19	6.9
6	1.3	4.4	42	50	14	18	303	81	55	13	25	5.9
7	1.3	6.1	38	45	14	18	239	74	86	12	16	4.9
8	3.9	4.8	35	45	14	18	239	69	78	143	70	4.5
9	5.6	10	35	45	14	18	294	64	68	27	37	24
10	2.3	12	29	45	14	18	273	60	57	17	24	16
11	3.3	8.1	27	55	14	18	224	56	49	13	49	9.9
12	4.3	6.3	47	56	14	18	211	53	44	30	55	8.1
13	2.6	5.7	39	45	14	19	185	90	40	24	28	18
14	2.2	6.0	32	45	14	19	305	86	43	14	21	21
15	2.7	14	30	40	14	20	506	71	40	12	17	17
16	3.2	12	26	40	14	70	377	63	38	18	13	15
17	5.2	9.4	27	45	14	300	264	103	34	11	12	300
18	7.8	8.3	26	50	14	250	214	320	32	7.6	12	175
19	14	8.2	26	50	14	230	182	209	43	5.9	10	82
20	8.9	8.3	23	45	14	190	162	140	38	4.9	20	55
21	2.8	23	22	45	15	225	141	109	32	9.0	31	44
22	2.2	31	27	40	25	186	127	92	28	5.9	36	173
23	13	51	39	35	40	190	113	81	26	6.2	21	252
24	2.7	41	177	30	37	217	109	74	23	4.2	14	98
25	2.3	28	438	27	35	263	123	164	21	3.5	11	62
26	1.9	46	258	25	33	202	109	117	19	5.2	9.9	46
27	1.7	33	146	23	30	177	99	99	18	132	8.5	38
28	2.0	43	109	22	30	172	136	86	17	69	7.6	32
29	1.4	35	92	21	27	158	162	74	16	37	7.3	28
30	1.7	32	83	20	---	146	209	65	14	21	15	26
31	1.8	---	76	19	---	213	---	68	---	24	8.5	---
TOTAL	118.5	509.8	2099	1317	562	3473	7066	3163	1256	728.3	666.8	1615.3
MEAN	3.82	17.0	67.7	42.5	19.4	112	236	102	41.9	23.5	21.5	53.8
MAX	14	51	438	71	40	300	652	320	86	143	70	300
MIN	1.3	2.5	22	19	14	18	99	53	14	3.5	7.3	4.5
CFSM	.03	.15	.59	.37	.17	.97	2.05	.89	.36	.20	.19	.47
IN.	.04	.16	.68	.43	.18	1.12	2.29	1.02	.41	.24	.22	.52

CAL YR 1979 TOTAL 17894.72 MEAN 49.0 MAX 950 MIN .44 CFSM .43 IN 5.79
WTR YR 1980 TOTAL 22574.70 MEAN 61.7 MAX 652 MIN 1.3 CFSM .54 IN 7.30

04148440 THREAD CREEK NEAR FLINT, MI

LOCATION.--Lat 42°58'30", long 83°38'09", in SE¼ SE¼ sec.28, T.7 N., R.7 E., Genesee County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on Bristol Road, 6.0 mi (9.7 km) upstream from mouth, and 4.0 mi (6.4 km) southeast of Flint.

DRAINAGE AREA.--54.4 mi^2 (140.9 km^2).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 764.36 ft (232.977 m) National Geodetic Vertical Datum of 1929. Prior to May 13, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year. Gage-height telemark at station.

AVERAGE DISCHARGE.--10 years, 36.5 ft^3/s (1.034 m^3/s), 9.11 in/yr (231 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,260 ft^3/s (35.7 m^3/s) Apr. 19, 1975, gage height, 7.65 ft (2.332 m) from high water marks; no flow Aug. 7, 8, 10, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 254 ft^3/s (7.19 m^3/s) Apr. 4; maximum gage height, 5.54 ft (1.689 m) Mar. 19, backwater from ice, no peak above base of 300 ft^3/s (8.50 m^3/s); minimum discharge, 1.5 ft^3/s (0.042 m^3/s) Oct. 9, gage height, 0.90 ft (0.274 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.6	5.3	22	40	7.0	17	90	82	23	6.4	9.8	10
2	3.5	6.3	18	35	7.0	15	90	75	21	5.8	11	9.3
3	2.8	5.2	15	32	6.5	13	96	64	33	5.1	13	7.9
4	2.0	5.1	13	28	6.5	13	217	54	26	4.6	12	7.0
5	5.6	4.9	16	26	6.0	13	222	47	25	10	17	6.4
6	5.5	5.1	18	23	6.0	13	181	40	26	7.2	17	5.8
7	3.0	6.1	18	21	6.0	13	136	35	38	5.2	11	5.4
8	2.1	5.3	18	21	5.7	13	114	31	35	88	18	4.8
9	3.3	5.6	18	21	5.5	13	118	27	33	31	13	9.5
10	2.5	9.9	18	18	5.5	13	118	25	30	28	12	7.5
11	1.9	6.9	14	25	5.5	13	110	23	26	20	17	6.5
12	7.5	6.8	25	23	5.5	13	102	22	22	16	26	6.7
13	6.7	6.3	18	22	5.5	13	87	38	18	13	12	20
14	5.3	6.7	17	20	5.5	13	122	44	18	10	9.9	15
15	4.1	8.3	15	19	5.5	14	171	41	16	8.9	8.7	11
16	3.0	9.7	14	19	5.5	30	192	44	15	10	7.6	10
17	4.1	7.8	13	21	5.5	70	154	49	14	8.0	6.9	106
18	3.7	7.5	12	23	5.5	160	120	103	13	6.7	6.8	38
19	5.1	7.3	11	23	6.0	150	97	78	17	5.7	6.2	31
20	6.5	7.4	11	21	7.0	147	83	83	21	5.0	9.3	29
21	3.4	13	11	20	11	132	69	70	18	6.0	17	23
22	4.0	17	14	18	18	105	60	56	15	5.1	13	45
23	6.0	24	20	16	28	98	52	44	13	4.8	11	64
24	4.7	27	56	14	26	105	47	37	10	5.1	9.7	26
25	4.6	21	128	13	25	110	50	31	9.4	4.4	8.6	21
26	3.8	38	104	12	23	107	43	26	8.2	4.5	7.9	17
27	3.5	27	113	11	22	97	42	22	7.6	41	7.1	13
28	3.4	36	92	10	20	89	60	21	6.9	13	6.2	12
29	3.3	29	73	9.0	18	82	66	26	6.8	12	5.9	11
30	3.5	25	59	9.0	---	75	83	34	6.6	12	7.4	9.6
31	3.6	---	48	8.0	---	94	---	35	---	11	6.2	---
TOTAL	124.6	390.5	1042	621.0	309.7	1853	3192	1407	571.5	413.5	344.2	588.4
MEAN	4.02	13.0	33.6	20.0	10.7	59.8	106	45.4	19.1	13.3	11.1	19.6
MAX	7.5	38	128	40	28	160	222	103	38	88	26	106
MIN	1.9	4.9	11	8.0	5.5	13	42	21	6.6	4.4	5.9	4.8
CFSM	.07	.24	.62	.37	.20	1.10	1.95	.84	.35	.24	.20	.36
IN.	.09	.27	.71	.42	.21	1.27	2.19	.96	.39	.28	.24	.40

CAL YR 1979 TOTAL 8467.31 MEAN 23.2 MAX 235 MIN .71 CFSM .43 IN 5.79
WTR YR 1980 TOTAL 10857.40 MEAN 29.7 MAX 222 MIN 1.9 CFSM .55 IN 7.42

04148500 FLINT RIVER NEAR FLINT, MI

LOCATION.--Lat 43°02'20", long 83°46'10", in SW¼ sec.4, T.7 N., R.6 E., Genesee County, Hydrologic Unit 04080204, on left bank on grounds of sewage-treatment plant, 1.2 mi (1.9 km) upstream from Pirnie Creek, 1.8 mi (2.9 km) downstream from Flint, and 5.0 mi (8.0 km) downstream from Swartz Creek.

DRAINAGE AREA.--956 mi² (2,476 km²).

PERIOD OF RECORD.--September 1903 to March 1904 (gage heights only), August 1932 to current year. Gage-height records for flood seasons collected in this vicinity 1911-32, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1933-34(M), 1935-37. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 678.80 ft (206.898 m) National Geodetic Vertical Datum of 1929 (levels by U.S. Weather Bureau and city of Flint).

REMARKS.--Records good. Some regulation by reservoirs above station (station 04147000). Occasional diversion for industrial use. Since Dec. 17, 1967, flow contains up to 50 ft³/s (1.42 m³/s) as sewage effluent which originates outside the basin. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--48 years, 573 ft³/s (16.23 m³/s), 8.14 in/yr (207 mm/yr), adjusted for storage since 1954.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,900 ft³/s (422 m³/s) Apr. 6, 1947, gage height, 16.35 ft (4.983 m); minimum, 9.0 ft³/s (0.25 m³/s) Aug. 7, 1934.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,660 ft³/s (104 m³/s) Sept. 22, gage height, 9.02 ft (2.749 m); minimum, 76 ft³/s (2.15 m³/s) Oct. 1, gage height, 2.71 ft (0.826 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	97	194	723	1090	269	326	1610	807	413	187	809	338
2	123	174	637	996	248	295	1460	785	409	190	817	358
3	101	160	580	827	229	283	1650	723	600	180	786	317
4	123	170	790	790	226	268	2830	659	473	177	728	292
5	125	224	795	690	218	268	2380	584	434	246	755	277
6	110	210	739	590	210	288	2240	543	548	183	701	255
7	170	214	325	564	205	279	2240	510	738	176	677	228
8	266	217	296	494	201	262	2300	492	750	1010	836	221
9	300	268	344	468	195	261	2350	480	735	352	676	341
10	272	285	427	451	190	296	2130	461	700	307	585	254
11	392	220	424	847	199	290	1940	447	645	294	615	217
12	434	203	624	727	196	276	1870	440	594	323	628	220
13	426	209	513	647	194	278	1750	736	523	284	509	338
14	409	208	464	629	193	300	2130	699	540	254	452	312
15	395	265	435	599	197	296	3010	625	481	257	403	312
16	198	257	432	578	197	365	3010	654	412	303	338	327
17	134	218	344	766	190	1610	2610	823	356	252	300	1550
18	116	212	332	779	197	2090	2490	1580	337	218	275	1270
19	169	218	333	732	197	1870	2420	1340	430	190	258	1020
20	181	222	331	682	200	1990	2110	1180	400	178	307	972
21	113	324	326	622	205	2480	1740	1010	328	212	502	881
22	115	433	354	607	592	2070	1330	977	312	223	472	1420
23	170	574	469	542	626	2000	1330	922	317	190	372	2240
24	111	548	1040	428	545	1910	1240	812	308	169	333	1820
25	103	444	2030	374	515	1820	1190	785	277	164	319	1490
26	112	638	1730	367	482	1670	1010	659	248	179	291	1340
27	254	733	1490	349	470	1570	946	555	236	1070	264	1150
28	207	882	1500	344	430	1500	1060	548	217	651	249	971
29	174	818	1520	326	368	1380	813	476	197	550	237	910
30	169	755	1430	306	---	1370	863	405	189	581	283	821
31	158	---	1240	283	---	1560	---	469	---	707	232	---
TOTAL	6227	10497	23057	19494	8384	31521	56052	22186	13147	10257	15009	22462
MEAN	201	350	744	597	289	1017	1868	716	438	331	484	749
MAX	434	882	2030	1090	626	2480	3010	1580	750	1070	836	2240
MIN	97	160	296	283	190	261	813	405	189	164	232	217
MEAN+	174	350	739	580	291	1033	1866	802	434	341	476	751
CFSM+	.18	.37	.77	.61	.30	1.08	1.95	.84	.45	.36	.50	.79
IN+	.21	.41	.89	.70	.33	1.25	2.18	.97	.51	.41	.57	.88

CAL YR 1979 TOTAL 188012 MEAN 515 MAX 3540 MIN 97 MEAN+ 517 CFSM+ .54 IN+ 7.34
WTR YR 1980 TOTAL 237293 MEAN 648 MAX 3010 MIN 97 MEAN+ 653 CFSM+ .68 IN+ 9.30

+ Adjusted for change in contents in Holloway Reservoir.

04148720 BRENT RUN NEAR MONTROSE, MI

LOCATION.--Lat 43°10'12", long 83°50'03", in SE¼ NE¼ sec.23, T.9 N., R.5 E., Genesee County, Hydrologic Unit 04080204, on right bank 10 ft (3 m) downstream from bridge on Morrish Road, 0.8 mi (1.3 km) upstream from Central-Stadler Drain, 3.0 mi (4.8 km) upstream from mouth, and 3.1 mi (5.0 km) east of Montrose.

DRAINAGE AREA.--20.8 mi² (53.9 km²).

PERIOD OF RECORD.--January 1970 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 655 ft (200 m) from topographic map (nearest 5 ft). Prior to Aug. 26, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 14.5 ft³/s (0.411 m³/s), 9.47 in/yr (241 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 730 ft³/s (20.7 m³/s) Dec. 31, 1972, gage height, 6.34 ft (1.932 m); maximum gage height, 7.08 ft (2.158 m) Mar. 15, 1971, backwater from ice; minimum discharge, 1.9 ft³/s (0.054 m³/s) Oct. 13, 1978; minimum gage height, 1.01 ft (0.308 m) Aug. 9, 17, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 225 ft³/s (6.37 m³/s) Mar. 18, based on correlations with nearby stations, gage height, 5.58 ft (1.701 m), backwater from ice, no peak above base of 250 ft³/s (7.08 m³/s); minimum discharge, 2.8 ft³/ s (0.079 m³/s) Oct. 2, minimum gage height, 1.07 ft (0.326 m) Sept. 8, 9.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.0	4.7	7.8	6.3	3.0	3.5	28	15	8.3	3.3	8.4	5.6
2	2.9	8.5	9.2	5.9	3.0	3.5	14	11	6.2	3.4	5.2	15
3	3.0	6.5	7.7	6.5	3.0	3.5	13	8.8	9.0	3.2	5.3	8.9
4	4.0	4.7	6.7	5.8	3.0	3.5	72	7.6	13	3.4	4.3	5.2
5	5.6	4.4	6.4	6.0	3.0	3.5	52	6.7	5.9	3.8	3.7	4.3
6	10	4.0	7.9	6.0	3.0	3.5	17	6.3	7.4	8.8	7.7	3.8
7	6.1	4.4	8.3	6.0	3.2	3.5	12	5.8	17	4.0	5.4	3.6
8	4.3	6.1	7.5	6.5	3.0	3.5	12	5.5	27	14	4.8	3.1
9	4.3	5.4	6.5	6.5	3.0	3.5	22	5.5	9.5	30	13	3.4
10	6.4	7.0	6.0	7.0	3.0	3.5	19	5.2	9.1	7.4	5.5	17
11	4.8	9.1	6.2	8.0	3.0	3.5	15	5.6	6.5	5.5	6.1	5.2
12	4.3	5.4	7.0	10	3.0	3.5	12	4.9	5.3	4.8	9.0	4.2
13	4.6	4.5	14	8.0	3.0	3.5	13	7.3	4.8	7.9	5.5	4.9
14	4.8	4.2	7.1	6.0	3.0	3.4	14	34	5.6	4.5	4.2	13
15	4.6	4.5	7.0	4.5	3.0	7.0	85	11	8.4	3.9	3.8	5.1
16	4.2	9.1	7.0	4.5	3.0	20	52	7.7	5.3	8.2	3.5	3.9
17	4.0	7.3	7.5	4.5	3.0	45	20	7.8	4.5	9.8	3.5	21
18	5.4	5.2	7.5	4.5	3.0	150	14	67	4.2	4.7	3.2	58
19	5.4	4.5	7.8	4.5	3.5	60	11	56	4.5	4.2	3.2	9.9
20	8.0	4.2	7.6	4.0	6.0	21	10	17	15	4.7	3.7	6.7
21	7.5	5.4	8.2	4.0	10	21	9.8	11	6.8	4.9	9.3	5.8
22	4.6	27	8.4	4.0	20	30	8.0	9.2	5.0	7.1	21	14
23	5.0	31	14	4.0	40	21	7.4	7.6	4.1	6.6	6.4	66
24	12	35	24	4.0	20	15	7.1	6.7	3.7	5.2	4.6	25
25	5.6	18	119	3.5	8.0	16	15	6.4	3.8	3.7	3.7	9.9
26	4.6	17	110	3.5	4.5	13	13	5.5	3.5	3.6	3.3	8.3
27	4.2	18	19	3.5	4.0	13	8.9	4.9	3.8	32	3.5	6.5
28	4.2	12	12	3.5	4.0	12	12	4.5	4.7	69	3.4	5.6
29	4.5	18	9.2	3.5	3.5	11	18	4.7	4.5	14	3.1	4.8
30	4.4	9.5	7.9	3.5	---	10	24	4.7	3.7	7.8	4.6	4.4
31	4.2	---	7.1	3.0	---	11	---	6.1	---	6.5	9.4	---
TOTAL	160.5	304.6	491.5	181.0	177.7	524.9	630.2	367.0	220.1	299.9	181.3	352.1
MEAN	5.18	10.2	15.9	5.19	6.13	16.9	21.0	11.8	7.34	9.67	5.85	11.7
MAX	12	35	119	10	40	150	85	67	27	69	21	66
MIN	2.9	4.0	6.0	3.0	3.0	3.4	7.1	4.5	3.5	3.2	3.1	3.1
CFSM	.25	.49	.76	.25	.30	.81	1.01	.57	.35	.47	.28	.56
IN.	.29	.54	.88	.29	.32	.94	1.13	.66	.39	.54	.32	.63

CAL YR 1979 TOTAL 3721.9 MEAN 10.2 MAX 330 MIN 2.8 CFSM .49 IN 6.66
WTR YR 1980 TOTAL 3870.8 MEAN 10.6 MAX 150 MIN 2.9 CFSM .51 IN 6.92

04149000 FLINT RIVER NEAR FOSTERS, MI

LOCATION.--Lat 43°18'30", long 83°57'13", in SE¼ SE¼ sec.35, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 20 ft (6 m) downstream from bridge on State Highway 13, 2 mi (3 km) west of Fosters and 6.5 mi (10.5 km) downstream from Silver Creek. Records include flow of Birch Run.

DRAINAGE AREA.--1,188 mi² (3,077 km²), includes that of Birch Run above State Highway 13.

PERIOD OF RECORD.--October 1939 to current year. Monthly discharge only for some periods, published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-20, 1922-27 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 954: 1941. WSP 1337: 1940, 1942, 1943-44(M), 1945, 1946-47(M), 1948-50. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 600 ft (183 m) from topographic map. Prior to Oct. 1, 1969, nonrecording gage at site 2.2 mi (3.5 km) upstream at datum 582.22 ft (177.461 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by reservoirs above Flint. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--41 years, 724 ft³/s (20.50 m³/s), 8.28 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 19,000 ft³/s (538 m³/s) Apr. 7, 1947 (including flow bypassing gage); maximum gage height, 18.6 ft (5.67 m) Feb. 2, 1968, site and datum then in use; minimum discharge observed, 27 ft³/s (0.76 m³/s) Aug. 6, 1941.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of March 1904, reached a stage of 18.4 ft (5.61 m) from U.S. Weather Bureau data, site and datum then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 3,640 ft³/s (103 m³/s) Apr. 15, gage height, 11.80 ft (3.597 m); minimum, 140 ft³/s (3.965 m³/s) Oct. 2, gage height, 2.02 ft (0.616 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	168	193	760	1220	330	450	1790	1170	499	248	974	319
2	146	224	715	1080	310	380	1600	1020	496	243	890	445
3	168	208	616	992	300	360	1620	916	562	241	865	463
4	162	195	607	808	290	350	3130	833	652	235	799	393
5	164	199	784	781	280	340	2750	766	526	235	739	357
6	193	243	802	688	280	370	2270	691	538	310	808	327
7	170	239	694	650	280	360	2220	628	730	246	718	302
8	197	235	409	590	260	350	2430	595	1240	595	697	274
9	307	248	370	550	260	340	2440	568	929	983	942	282
10	320	307	415	520	250	339	2160	556	865	445	706	413
11	302	300	463	970	260	367	2020	535	772	378	628	317
12	395	250	508	870	260	362	1930	514	718	355	733	302
13	409	235	637	750	260	349	1840	568	658	390	664	292
14	412	237	541	720	250	352	2900	951	610	350	571	416
15	395	237	490	700	260	359	3560	772	631	312	550	382
16	375	295	475	670	260	364	2960	700	538	329	472	367
17	230	280	448	800	250	817	2520	703	475	384	400	745
18	184	246	390	912	250	2680	2440	1560	425	319	372	1630
19	166	239	380	851	260	2180	2450	1970	407	277	342	1170
20	215	248	380	775	260	1950	2450	1510	553	252	335	1000
21	215	252	380	697	270	2190	2180	1280	463	257	398	941
22	164	427	400	664	550	2380	1850	1130	384	292	643	848
23	168	568	430	640	800	2100	1440	1050	359	347	700	2290
24	210	706	604	520	740	1980	1400	974	364	284	445	2370
25	164	589	1860	440	640	1970	1350	862	347	239	398	1770
26	152	577	2460	420	620	1770	1380	826	329	234	388	1510
27	154	691	1750	400	600	1660	1180	670	317	742	358	1320
28	270	833	1540	390	550	1590	1120	580	320	1410	334	1090
29	226	878	1510	370	500	1490	1250	568	315	846	314	970
30	204	814	1490	350	---	1440	1170	502	272	694	302	890
31	197	---	1380	340	---	1570	---	487	---	736	354	---
TOTAL	7204	11193	24688	21128	10680	33559	61800	26455	16294	13208	17839	24195
MEAN	232	373	796	682	368	1083	2060	853	543	426	575	807
MAX	412	878	2460	1220	800	2680	3560	1970	1240	1410	974	2370
MIN	146	193	370	340	250	339	1120	487	272	234	302	274

CAL YR 1979 TOTAL 218061 MEAN 597 MAX 6150 MIN 146
WTR YR 1980 TOTAL 268243 MEAN 733 MAX 3560 MIN 146

04149500 FLINT RIVER NEAR ALICIA, MI

LOCATION.--Lat 43°18'40", long 84°02'00", in SE¼ sec.31, T.11 N., R.4 E., Saginaw County, Hydrologic Unit 04080204, on left bank 100 ft (30 m) downstream from the Prairie Farms Association flood-pumping station, 2.8 mi (4.5 km) north of Alicia, and 4 mi (6 km) upstream from mouth.

PERIOD OF RECORD.--November 1948 to current year (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 577.00 ft (175.870 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Records represent stages in the Shiawassee Flats area.

EXTREMES FOR PERIOD OF RECORD.--Maximum gage height, 13.70 ft (4.176 m) Apr. 3, 1960; minimum, less than 1.5 ft (0.46 m) during many days in 1949, 1958, 1959, 1963, 1964, 1966-69.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 7.66 ft (2.335 m) Apr. 16; minimum, 2.17 ft (0.661 m) Nov. 1.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.57	3.09	4.50	4.51	3.98	---	5.10	5.33	4.64	4.34	4.61	4.17
2	5.11	3.47	4.63	4.64	3.97	---	5.05	5.17	4.31	4.60	4.65	4.24
3	4.25	3.88	3.12	4.56	3.96	---	5.06	5.05	4.56	4.38	4.66	4.46
4	4.32	3.97	4.07	4.40	3.91	---	5.85	4.80	4.55	4.41	4.54	4.01
5	4.34	3.82	3.64	4.47	3.81	3.76	6.64	4.45	4.20	4.23	4.21	4.25
6	4.11	4.16	4.09	4.06	3.78	3.63	6.59	4.66	4.14	4.68	4.41	4.49
7	4.31	4.05	3.74	3.05	3.77	3.59	6.25	4.50	4.72	4.11	4.29	4.45
8	4.32	3.16	4.16	3.83	3.81	3.63	6.01	4.44	5.25	4.54	4.44	4.29
9	4.52	4.41	3.54	4.20	3.78	3.46	6.14	4.24	5.20	4.76	4.79	4.13
10	4.32	4.34	4.18	4.09	3.70	3.41	6.48	4.03	5.19	4.37	4.72	4.43
11	3.95	3.98	3.56	3.64	3.56	3.65	6.49	3.94	5.03	4.46	4.53	4.11
12	3.78	3.91	4.44	4.02	3.69	3.99	6.47	4.35	4.70	4.55	4.62	4.47
13	4.09	3.98	4.24	4.53	3.52	3.71	6.33	4.67	4.32	4.41	4.59	4.03
14	4.15	4.03	3.88	4.32	3.65	3.46	6.60	4.68	4.41	4.26	4.44	4.71
15	3.98	3.86	3.43	4.37	3.79	3.78	6.99	4.42	5.05	4.12	4.75	4.70
16	4.34	4.05	4.48	4.23	3.72	3.59	7.58	4.45	4.86	4.35	4.85	3.90
17	4.06	3.60	4.00	4.21	3.61	3.86	7.33	4.48	4.31	4.42	4.46	5.15
18	4.27	3.94	4.04	4.39	3.40	5.64	6.87	4.93	4.47	4.38	4.20	4.69
19	3.60	3.69	3.95	4.49	3.48	6.02	6.42	5.76	4.92	4.22	4.35	4.84
20	3.87	3.79	3.92	4.38	3.63	5.88	6.07	5.72	4.93	4.34	4.26	4.49
21	3.80	4.27	3.95	4.18	3.93	6.12	5.62	5.39	4.47	4.47	4.25	4.53
22	3.76	3.95	3.87	3.87	3.96	6.32	5.26	5.04	4.25	4.68	4.54	4.58
23	3.24	3.88	3.95	4.31	4.18	6.14	5.14	4.84	4.28	4.73	4.62	5.40
24	4.06	3.98	4.71	4.12	4.32	5.89	5.20	4.67	4.34	4.48	4.43	5.68
25	4.51	4.13	6.41	4.06	4.48	5.67	4.98	5.24	4.24	4.34	4.28	5.28
26	4.29	3.95	6.09	4.06	4.07	5.38	5.06	4.80	4.26	4.56	4.27	5.18
27	3.86	3.45	5.76	3.98	3.89	5.06	5.04	4.40	4.78	4.92	4.41	4.88
28	3.77	4.29	5.42	3.88	4.18	4.98	5.43	4.53	4.61	5.68	4.69	4.94
29	4.31	4.00	5.20	4.03	4.00	5.22	5.25	4.41	4.32	5.20	4.31	4.42
30	4.15	3.98	4.94	4.07	---	5.02	5.29	4.07	4.54	4.90	4.21	4.37
31	3.91	---	4.69	4.01	---	5.20	---	3.59	---	4.72	4.37	---
MEAN	4.13	3.90	4.34	4.16	3.85	---	5.95	4.68	4.60	4.54	4.48	4.58
MAX	5.11	4.41	6.41	4.64	4.48	---	7.58	5.76	5.25	5.68	4.85	5.68
MIN	3.24	3.09	3.12	3.05	3.40	---	4.98	3.59	4.14	4.11	4.20	3.90

04150000 SOUTH BRANCH CASS RIVER NEAR CASS CITY, MI

LOCATION.--Lat 43°34'01", long 83°06'43", in SW¼ NW¼ sec.7, T.13 N., R.12 E., Sanilac County, Hydrologic Unit 04080205, on left bank 1.5 mi (2.4 km) downstream from bridge on State Highway 53, 3.9 mi (6.3 km) southeast of Cass City, 4.2 mi (6.8 km) upstream from confluence with North Branch.

DRAINAGE AREA.--238 mi^2 (616 km^2).

PERIOD OF RECORD.--October 1948 to September 1980 (discontinued). Monthly discharge only for some periods, published in WSP 1307. Prior to October 1963, published as East Branch Cass River near Cass City.

REVISED RECORD.--WSP 1337: 1949-50. WSP 1707: 1951-53, 1959. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 719.5 ft (219.3 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 8, 1952, nonrecording gage at site 1.5 mi (2.4 km) upstream at different datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 123 ft^3/s (3.483 m^3/s), 7.02 in/yr (178 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,400 ft^3/s (181 m^3/s) Mar. 28, 1967, gage height, 14.86 ft (4.529 m); minimum, 0.2 ft^3/s (0.006 m^3/s) Sept. 20-23, 1955, Aug. 19, 20, 1958.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,100 ft^3/s (31.2 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 26	0200	1720	48.7	8.24	2.512
Mar. 18	1200	*3100	87.8	*10.55	3.216
Apr. 4	2200	1710	48.4	8.37	2.551
Apr. 15	1300	1900	53.8	8.68	2.646
Sep. 24	unknown	a1160	32.9	unknown	

a Based on correlation with other stations.

Minimum discharge 3.9 ft^3/s (0.110 m^3/s) Oct. 1, gage height, 1.77 ft (0.539 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	6.9	45	93	23	38	373	175	18	36	170	9.8
2	4.2	8.0	34	80	23	37	303	139	23	27	250	13
3	4.6	8.0	29	65	23	37	224	107	25	22	140	13
4	4.8	8.7	24	60	24	37	986	85	26	18	80	14
5	5.5	7.8	21	56	24	38	1110	72	23	17	50	14
6	5.7	7.2	23	54	24	38	421	60	26	15	42	11
7	5.9	7.5	42	51	25	38	266	52	31	14	32	9.1
8	6.0	8.4	72	48	25	38	222	47	38	15	30	8.1
9	6.6	9.1	60	45	25	39	311	43	48	14	33	7.5
10	6.3	9.6	45	42	25	39	431	40	52	17	31	7.4
11	6.5	9.0	35	41	24	39	366	37	43	18	29	6.8
12	6.8	9.7	29	41	24	40	283	36	35	17	28	7.1
13	6.4	8.9	29	42	24	42	328	38	27	15	27	9.4
14	6.3	7.6	28	42	23	45	344	58	21	12	25	9.6
15	6.3	7.6	28	41	23	50	1590	75	23	12	24	12
16	5.9	7.9	27	40	23	58	1200	68	20	19	22	12
17	5.9	7.7	27	41	23	350	540	64	14	15	20	49
18	6.4	7.3	26	42	23	2690	300	138	13	14	19	159
19	6.6	6.9	26	43	23	1400	217	292	18	13	16	296
20	7.4	6.6	25	43	24	485	172	241	30	13	15	104
21	8.3	7.5	25	43	26	293	142	162	32	21	15	41
22	10	12	26	42	32	236	119	123	33	20	13	28
23	9.6	20	32	41	50	237	100	103	31	18	12	200
24	8.2	31	89	40	170	216	86	76	24	70	12	940
25	7.7	57	976	37	160	216	74	45	21	60	11	400
26	7.6	66	1380	34	100	268	66	35	18	45	10	200
27	7.6	97	548	29	64	494	59	28	17	40	8.8	130
28	7.4	94	266	27	45	668	69	25	17	45	8.8	88
29	7.5	68	169	25	38	404	110	22	25	400	8.3	60
30	7.0	59	132	24	---	263	170	20	44	350	8.6	50
31	6.6	---	111	23	---	210	---	18	---	200	8.8	---
TOTAL	205.6	671.9	4429	1375	1160	9083	10982	2524	816	1612	1199.3	2908.8
MEAN	6.63	22.4	143	44.4	40.0	293	366	81.4	27.2	52.0	38.7	97.0
MAX	10	97	1380	93	170	2690	1590	292	52	400	250	940
MIN	4.0	6.6	21	23	23	37	59	18	13	12	8.3	6.8
CFSM	.03	.09	.60	.19	.17	1.23	1.54	.34	.11	.22	.16	.41
IN.	.03	.11	.69	.21	.18	1.42	1.72	.39	.13	.25	.19	.45

CAL YR 1979 TOTAL 35972.0 MEAN 98.6 MAX 2440 MIN 3.4 CFSM .41 IN 5.62
WTR YR 1980 TOTAL 36966.6 MEAN 101 MAX 2690 MIN 4.0 CFSM .42 IN 5.78

04150500 CASS RIVER AT CASS CITY, MI

LOCATION.--Lat 43°35'03", long 83°10'34", in NE¼ NE¼ sec.4, T.13 N., R.11 E., Tuscola County, Hydrologic Unit 04080205, on left bank 600 ft (183 m) downstream from bridge on Cemetary Road, 0.3 mi (0.5 km) downstream from confluence of North and South Branches, and 1.1 mi (1.8 km) south of Cass City.

DRAINAGE AREA.--359 mi² (930 km²).

PERIOD OF RECORD.--October 1947 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1337: 1949-50. WSP 1727: 1948(M), 1950. WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 697.92 ft (212.726 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 14, 1952, nonrecording gage at site 600 ft (183 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 198 ft³/s (5.607 m³/s), 7.49 in/yr (190 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,460 ft³/s (240 m³/s) Mar. 20, 1948, gage height, 15.80 ft (4.816 m), from graph based on gage readings; minimum, 0.50 ft³/s (0.014 m³/s) Sept. 26, 1948.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,400 ft³/s (39.6 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 26	0400	1740	49.3	8.86	2.701	Apr. 4	2400	2020	57.2	9.28	2.829
Mar. 18	1400	*2910	82.4	*10.44	3.182	Apr. 15	1500	2160	61.2	9.51	2.899

Minimum discharge, 3.8 ft³/s (0.11 m³/s) Oct. 1, gage height, 4.49 ft (1.369 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.0	12	92	170	78	74	656	321	69	39	173	11
2	4.8	13	80	140	77	73	583	297	77	30	251	15
3	4.8	14	74	130	77	73	496	248	85	25	151	14
4	5.6	14	67	120	76	74	1170	201	85	22	87	15
5	6.0	14	56	110	76	74	1540	169	78	20	57	16
6	6.8	14	56	102	76	74	821	145	87	18	45	15
7	6.8	14	71	100	75	74	628	126	108	14	33	12
8	7.6	15	91	100	75	74	519	114	121	16	30	11
9	9.0	17	105	99	75	75	570	103	135	15	32	11
10	8.5	20	87	98	75	75	692	94	140	16	32	11
11	8.5	19	79	97	75	76	631	86	126	18	29	10
12	8.5	20	71	96	75	76	531	82	104	19	29	10
13	8.0	21	68	95	75	77	569	84	89	17	28	13
14	7.2	20	62	94	75	77	542	105	74	15	25	14
15	7.2	20	53	93	76	78	1810	120	71	13	24	15
16	8.0	18	48	93	76	80	1630	115	62	17	22	18
17	8.0	18	45	92	76	560	993	112	54	17	21	40
18	8.0	17	44	92	76	2170	679	211	47	14	20	169
19	8.6	17	43	91	77	1500	504	374	50	13	17	274
20	9.0	18	44	90	77	1060	397	353	57	13	16	179
21	9.8	21	47	90	78	743	327	283	57	18	15	101
22	12	30	57	89	80	537	270	225	57	22	15	67
23	13	44	75	88	90	511	233	176	45	19	13	240
24	12	64	136	86	110	449	203	143	38	55	13	1020
25	11	92	918	85	150	403	181	120	32	74	12	517
26	12	108	1520	84	100	428	160	102	27	44	11	243
27	12	130	765	82	80	642	147	89	24	39	10	157
28	12	140	487	80	76	903	159	82	23	38	9.5	108
29	11	115	350	80	75	670	214	78	27	424	9.5	77
30	11	105	250	79	---	554	288	77	39	401	11	59
31	11	---	210	78	---	496	---	73	---	209	10	---
TOTAL	271.7	1184	6151	3023	2357	12830	18143	4908	2088	1714	1251.0	3402
MEAN	8.76	39.5	198	97.5	81.3	414	605	158	69.6	55.3	40.4	113
MAX	13	140	1520	170	150	2170	1810	374	140	424	251	1020
MIN	4.0	12	43	78	75	73	147	73	23	13	9.5	10
CFSM	.02	.11	.55	.27	.23	1.15	1.69	.44	.19	.15	.11	.32
IN.	.03	.12	.64	.31	.24	1.33	1.88	.51	.22	.18	.13	.35

CAL YR 1979 TOTAL 59127.1 MEAN 162 MAX 2480 MIN 4.0 CFSM .45 IN 6.13
WTR YR 1980 TOTAL 57322.7 MEAN 157 MAX 2170 MIN 4.0 CFSM .44 IN 5.94

04150800 CASS RIVER AT WAHJAMEGA, MI

LOCATION.--Lat 43°27'02", long 83°26'29", in NW¼ NW¼ sec.20, T.12 N., R.9 E., Tuscola County, Hydrologic Unit 04080205, on right bank 90 ft (27 m) upstream from bridge on Chambers Road, on grounds of Caro Regional Center at Wahjamega, 1.9 mi (3.1 km) downstream from Michigan Sugar Co. dam, and 40 mi (64 km) upstream from mouth.

DRAINAGE AREA.--645 mi² (1,671 km²).

PERIOD OF RECORD.--October 1968 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 650 ft (198 m) from topographic map. Prior to June 19, 1969, nonrecording gage at bridge 90 ft (27 m) downstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Some regulation by dam at Michigan Sugar Co., 1.9 mi (3.1 km) above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--12 years, 384 ft³/s (10.87 m³/s), 8.08 in/yr (205 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 11,700 ft³/s (331 m³/s) Mar. 6, 1976, gage height, 19.92 ft (6.072 m); minimum, 20 ft³/s (0.57 m³/s) Oct. 2, 3, 1979.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,400 ft³/s (68.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 26	1400	2440	69.1	9.73	2.966	Apr. 5	1100	2780	78.7	10.41	3.173
Mar. 19	0400	2990	84.7	10.82	3.298	Apr. 16	0400	*3580	101	*11.80	3.597

Minimum discharge, 20 ft³/s (0.57 m³/s) Oct. 2, 3; minimum gage height, 2.85 ft (0.869 m) Oct. 1, 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21	41	174	340	90	140	979	718	142	98	265	69
2	20	41	140	290	86	120	1010	639	156	95	275	105
3	20	40	105	240	82	100	852	539	173	72	272	108
4	21	39	115	190	79	81	1340	442	174	62	212	70
5	21	40	120	170	76	79	2570	368	161	60	182	58
6	21	42	124	152	74	80	1600	316	172	55	166	52
7	21	44	132	150	73	79	1110	272	196	51	154	47
8	22	45	154	148	72	76	930	248	238	55	142	45
9	23	46	128	145	70	77	1020	230	248	51	134	53
10	24	51	166	145	69	78	1230	216	249	50	124	49
11	25	52	168	145	68	80	1210	204	229	48	116	43
12	24	51	166	145	67	82	1000	191	199	47	120	39
13	24	50	158	145	66	84	1000	201	173	46	146	56
14	25	50	158	145	65	84	970	247	162	47	140	74
15	26	51	136	145	63	86	2460	272	156	47	100	69
16	26	50	120	145	63	92	3270	261	146	49	80	63
17	27	47	104	145	62	295	2130	248	132	51	66	195
18	27	45	120	145	62	1600	1340	507	120	54	59	338
19	27	44	115	145	62	2640	1000	823	119	53	54	371
20	28	44	103	140	61	1770	799	784	146	52	50	370
21	29	50	96	135	60	1260	665	606	146	92	48	258
22	30	87	108	130	74	885	560	468	138	90	49	197
23	33	126	143	125	90	786	488	364	125	86	44	259
24	34	157	227	120	160	721	425	291	106	78	39	945
25	37	174	926	115	290	621	391	244	93	100	37	1000
26	43	205	2270	112	250	623	355	205	83	124	35	517
27	45	222	1580	110	190	833	323	182	74	158	34	311
28	46	241	879	108	160	1310	354	166	76	172	32	237
29	46	223	633	102	150	1200	506	154	82	240	31	190
30	43	193	485	98	---	932	692	158	88	494	79	156
31	41	---	390	93	---	826	---	147	---	372	61	---
TOTAL	900	2591	10443	4663	2834	17720	32579	10711	4502	3149	3346	6344
MEAN	29.0	86.4	337	150	97.7	572	1086	346	150	102	108	211
MAX	46	241	2270	340	290	2640	3270	823	249	494	275	1000
MIN	20	39	96	93	60	76	323	147	74	46	31	39
CFSM	.05	.13	.52	.23	.15	.89	1.68	.54	.23	.16	.17	.33
IN.	.05	.15	.60	.27	.16	1.02	1.88	.62	.26	.18	.19	.37

CAL YR 1979 TOTAL 106370 MEAN 291 MAX 4300 MIN 20 CFSM .45 IN 6.13
WTR YR 1980 TOTAL 99782 MEAN 273 MAX 3270 MIN 20 CFSM .42 IN 5.75

04151500 CASS RIVER AT FRANKENMUTH, MI

LOCATION.--Lat 43°19'40", long 83°44'53", in NW¼ SE¼ sec.27, T.11 N., R.6 E., Saginaw County, Hydrologic Unit 04080205, on right bank 2,000 ft (610 m) below dam in Frankenmuth, 3,600 ft (1,097 m) above highway bridge on Dehmel Road, 3.4 mi (5.5 km) upstream from Dead Creek, and 17 mi (27 km) upstream from mouth.

DRAINAGE AREA.--841 mi² (2,178 km²).

PERIOD OF RECORD.--February 1908 to March 1909, July 1935 to September 1936, June 1939 to current year.

REVISED RECORDS.--WSP 1307: 1936(M), 1940(M). WSP 1727: 1952. WSP 1911: 1952. WDR MI-78 Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 583.96 ft (177.991 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1908 to March 1909, nonrecording gage at site 2,000 ft (610 m) upstream at datum 1.81 ft (0.552 m) lower. July 18 to Sept. 11, 1935, nonrecording gage, Sept. 12, 1935, to Sept. 30, 1936, and June 20, 1939, to Sept. 30, 1949, water-stage recorder, at site 3,600 ft (1,097 m) downstream at datum 0.04 ft (0.012 m) higher.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation by dams above station. Prior to 1950, regulation at low and medium flows by mill above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--42 years, 473 ft³/s (13.40 m³/s), 7.64 in/yr (194 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 17,700 ft³/s (501 m³/s) Mar. 18, 1942, gage height, 20.88 ft (6.364 m), site and datum then in use; maximum gage height, 23.37 ft (7.123 m) Feb. 3, 1968, backwater from ice; minimum daily discharge, about 1.5 ft³/s (0.042 m³/s) Aug. 6, 1944.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 4,050 ft³/s (115 m³/s) Apr. 16, gage height, 14.75 ft (4.496 m), only peak above base of 3,500 ft³/s (99.1 m³/s); minimum, 28 ft³/s (0.79 m³/s) Oct. 3; minimum gage height, 3.14 ft (0.957 m) Oct. 1, 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	30	67	246	431	108	180	1090	963	187	123	453	105
2	30	71	210	383	102	155	1210	851	204	124	347	126
3	30	70	160	320	100	135	1080	714	231	118	339	148
4	33	66	165	265	98	125	1470	590	238	102	298	129
5	48	64	188	210	96	122	2610	492	220	94	239	104
6	47	68	182	185	94	122	2280	416	227	90	211	91
7	39	78	178	190	93	122	1480	366	274	83	193	79
8	36	82	186	195	92	119	1280	323	394	111	187	74
9	41	85	177	195	91	120	1200	299	365	119	187	78
10	48	91	181	190	90	120	1420	277	356	101	165	87
11	42	89	194	190	90	121	1480	259	323	90	158	82
12	41	89	208	185	90	122	1310	244	273	84	158	75
13	42	86	200	185	90	125	1190	261	232	82	156	78
14	41	86	182	185	90	128	1210	339	210	78	173	98
15	40	89	171	185	90	131	2290	367	209	79	164	106
16	39	92	155	185	91	132	3930	357	197	93	132	104
17	43	92	133	185	91	358	2980	332	184	90	111	157
18	47	88	140	185	92	1180	1880	688	168	83	101	354
19	53	87	157	185	94	2830	1360	1060	163	82	95	400
20	47	89	147	180	95	2460	1070	1030	198	79	96	413
21	45	96	129	170	95	1720	871	805	202	132	94	341
22	46	124	137	165	96	1210	726	618	183	148	90	257
23	53	179	177	160	98	995	636	486	165	188	88	431
24	56	220	267	150	110	923	554	389	148	155	78	666
25	56	242	794	140	190	818	552	324	134	120	71	1200
26	63	263	1910	135	310	758	505	270	123	130	69	778
27	65	303	2090	130	270	869	448	234	115	268	66	464
28	67	309	1250	125	220	1280	469	218	127	404	64	335
29	68	313	842	120	200	1450	657	201	130	313	61	270
30	65	281	636	115	---	1180	917	200	123	511	66	226
31	63	---	511	110	---	1030	---	193	---	571	99	---
TOTAL	1464	3958	12303	5934	3466	21140	40075	14166	6303	4845	4809	7856
MEAN	47.2	132	397	191	120	682	1336	457	210	156	155	262
MAX	68	313	2090	431	310	2830	3930	1060	394	571	453	1200
MIN	30	64	129	110	90	119	448	193	115	78	61	74
CFSM	.06	.16	.47	.23	.14	.81	1.59	.54	.25	.19	.18	.31
IN.	.06	.18	.54	.26	.15	.94	1.77	.63	.28	.21	.21	.35

CAL YR 1979 TOTAL 138710 MEAN 380 MAX 5100 MIN 30 CFSM .45 IN 6.14
WTR YR 1980 TOTAL 126319 MEAN 345 MAX 3930 MIN 30 CFSM .41 IN 5.59

04152500 TOBACCO RIVER AT BEAVERTON, MI

LOCATION.--Lat 43°52'43", long 84°28'18", in NW¼ SE¼ sec.7, T.17 N., R.1 W., Gladwin County, Hydrologic Unit 04080201, on left bank 15 ft (5 m) downstream from bridge on Glidden Road, 1.0 mi (1.6 km) downstream from dam in Beaverton, and 2.0 mi (3.2 km) upstream from Venison Creek.

DRAINAGE AREA.--487 mi² (1,261 km²).

PERIOD OF RECORD.--July 1948 to current year.

REVISED RECORDS.--WSP 1307: 1948(M).

GAGE.--Water-stage recorder. Datum of gage is 683.27 ft (208.261 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources).

REMARKS.--Records good except those for the winter period, which are poor. Prior to Feb. 21, 1961, regulation at all stages by hydroelectric powerplant 1.0 mi (1.6 km) above station; occasional regulation since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 376 ft³/s (10.65 m³/s), 10.48 in/yr (266 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 7,680 ft³/s (217 m³/s) July 9, 1957, gage height, 12.95 ft (3.947 m); minimum, 5.6 ft³/s (0.16 m³/s) July 12, 13, 14, 1959, Aug. 21, 1961; minimum daily, 5.9 ft³/s (0.17 m³/s) July 12, 13, 1959.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,750 ft³/s (49.6 m³/s) Apr. 9, gage height, 6.19 ft (1.887 m); minimum, 28 ft³/s (0.79 m³/s) Oct. 5, gage height, 1.00 ft (0.305 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	176	240	302	269	201	209	425	622	246	272	168	165
2	167	265	251	263	201	208	409	495	248	244	165	189
3	165	262	226	246	201	204	417	468	252	217	163	205
4	185	244	242	175	200	194	439	438	248	215	161	203
5	155	234	270	195	200	194	492	393	238	220	157	188
6	87	230	268	200	192	190	528	309	342	208	152	172
7	74	228	265	174	198	188	518	262	468	199	149	162
8	72	231	261	182	200	190	554	232	522	200	151	157
9	57	227	249	198	194	192	1300	255	504	216	158	169
10	156	226	247	212	200	194	1560	278	369	216	158	205
11	256	224	270	251	193	194	1000	280	242	208	157	208
12	220	224	240	385	200	195	862	262	244	197	169	194
13	209	222	246	341	200	195	874	282	253	192	189	372
14	212	222	235	308	198	197	802	444	250	188	188	652
15	213	224	221	281	201	208	766	363	310	185	179	567
16	212	228	200	277	200	211	822	321	359	183	169	364
17	213	231	160	386	198	465	662	342	271	182	158	533
18	213	229	150	647	195	686	578	770	245	177	154	807
19	297	228	205	510	188	741	465	942	266	174	152	507
20	321	228	237	419	204	913	471	606	312	173	152	300
21	276	230	232	325	212	1120	504	402	323	179	155	271
22	216	261	231	313	223	936	477	333	301	191	169	358
23	252	368	245	260	227	634	444	298	232	198	172	583
24	303	391	325	220	224	502	375	298	212	177	162	495
25	304	331	483	210	230	408	402	290	211	166	151	315
26	269	381	617	208	220	380	417	270	188	162	148	250
27	244	587	515	206	207	397	402	236	200	175	149	272
28	237	551	411	205	206	401	390	236	321	189	148	269
29	243	384	351	204	208	401	441	236	554	191	152	256
30	243	331	313	203	---	414	626	238	366	184	157	239
31	234	---	279	202	---	432	---	244	---	173	156	---
TOTAL	6481	8462	8797	8475	5926	11993	18422	11445	9097	6041	4968	9627
MEAN	209	282	284	273	204	387	614	369	303	195	160	321
MAX	321	587	617	647	230	1120	1560	942	554	272	189	807
MIN	57	222	150	174	188	188	375	232	188	162	148	157
CFSM	.43	.58	.58	.56	.42	.80	1.26	.76	.62	.40	.33	.66
IN.	.50	.65	.67	.65	.45	.92	1.41	.87	.69	.46	.38	.74

CAL YR 1979 TOTAL 131341 MEAN 360 MAX 1900 MIN 57 CFSM .74 IN 10.03
WTR YR 1980 TOTAL 109736 MEAN 300 MAX 1560 MIN 57 CFSM .62 IN 8.38

04154000 CHIPPEWA RIVER NEAR MOUNT PLEASANT, MI

LOCATION.--Lat 43°37'32", long 84°42'28", in NW¼ NW¼ sec.8, T.14 N., R.3 W., Isabella County, Hydrologic Unit 04080202, on right bank 12 ft (4 m) downstream from bridge on South Lenton Road, 3.8 mi (6.1 km) northeast of Mount Pleasant, and 36 mi (58 km) upstream from mouth.

DRAINAGE AREA.--416 mi² (1,077 km²).

PERIOD OF RECORD.--October 1930 to September 1931, October 1932 to current year. Monthly discharge only for some periods published in WSP 1307. Gage-height records for flood seasons collected in this vicinity 1910-27, are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1337: 1931, 1933-40, 1945, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 710.38 ft (216.524 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Oct. 21, 1938, nonrecoridng gage at site 30 ft (9 m) upstream at present datum.

REMARKS.--Records good except those for the winter period, which are fair. Diurnal fluctuation below 750 ft³/s (21.2 m³/s) caused by powerplant at Mount Pleasant prior to 1962, occasional regulation at low flow since. Since July 30, 1968, occasional regulation by control structures on lake outlets. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--49 years, 304 ft³/s (8.609 m³/s), 9.92 in/yr (252 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,960 ft³/s (140 m³/s) Mar. 8, 1946, gage height, 12.78 ft (3.895 m); minimum, 12 ft³/s (0.34 m³/s) Aug. 18, 1945; minimum daily, 19 ft³/s (0.54 m³/s) Aug. 16, 1936; minimum gage height, 2.70 ft (0.823 m) Oct. 8, 1966.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 707 ft³/s (20.0 m³/s) Apr. 10, gage height, 4.74 ft (1.445 m); maximum gage height, 6.98 ft (2.128 m) Mar. 17, backwater from ice; no peak above base of 1,000 ft³/s (28.3 m³/s); minimum discharge, 118 ft³/s (3.34 m³/s) Oct. 1, 2; minimum gage height, 2.95 ft (0.899 m) Oct. 1, 2, 3.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	119	188	316	282	185	180	318	383	230	208	158	137
2	119	194	304	278	185	180	245	374	225	197	152	148
3	121	190	309	272	185	180	217	366	227	186	149	158
4	124	191	295	265	185	180	269	347	223	180	147	144
5	125	187	291	255	185	180	288	329	219	176	142	137
6	127	188	288	240	185	180	257	309	253	174	141	130
7	131	189	288	225	185	180	302	293	318	169	138	125
8	135	198	289	210	185	180	376	279	601	190	159	122
9	145	227	280	205	185	180	595	272	545	193	162	129
10	145	218	281	200	185	180	694	263	472	178	155	141
11	148	214	276	200	185	180	657	256	379	168	152	138
12	151	209	275	200	185	180	651	250	333	176	157	135
13	155	204	270	200	185	180	643	255	306	204	160	210
14	154	266	264	195	185	180	576	267	282	201	156	382
15	152	301	270	195	185	180	597	266	272	199	152	464
16	154	303	260	195	185	190	584	264	253	194	144	476
17	157	297	260	190	185	230	517	265	237	192	140	547
18	156	298	260	190	185	290	488	328	227	181	138	627
19	161	297	260	190	185	390	461	356	225	170	136	526
20	176	292	255	190	180	532	450	360	235	167	142	462
21	178	307	250	190	180	565	426	346	232	170	145	407
22	190	324	239	190	180	522	406	328	225	169	149	393
23	197	337	251	190	180	460	381	299	218	168	146	580
24	206	324	279	190	180	420	367	277	213	163	141	500
25	201	312	428	185	180	385	373	261	206	160	138	435
26	198	393	387	185	180	375	355	246	204	168	137	396
27	190	387	341	185	180	364	333	239	197	175	134	355
28	187	361	322	185	180	355	330	231	208	177	137	329
29	186	341	311	185	180	339	361	224	245	168	140	306
30	182	326	301	185	---	316	386	227	220	163	137	291
31	181	---	291	185	---	318	---	239	---	159	133	---
TOTAL	4951	8063	8991	6432	5315	8751	12903	8999	8230	5543	4517	9330
MEAN	160	269	290	207	183	282	430	290	274	179	146	311
MAX	206	393	428	282	185	565	694	383	601	208	162	627
MIN	119	187	239	185	180	180	217	224	197	159	133	122
CFSM	.39	.65	.70	.50	.44	.68	1.03	.70	.66	.43	.35	.75
IN.	.44	.72	.80	.58	.48	.78	1.15	.80	.74	.50	.40	.83

CAL YR 1979 TOTAL 108428 MEAN 297 MAX 1390 MIN 111 CFSM .71 IN 9.70
WTR YR 1980 TOTAL 92025 MEAN 251 MAX 694 MIN 119 CFSM .60 IN 8.23

04155000 PINE RIVER AT ALMA, MI

LOCATION.--Lat 43°22'46", long 84°39'20", in SW¼ SE¼ sec.34, T.12 N., R.3 W., Gratiot County, Hydrologic Unit 04080202, on right bank 270 ft (32 m) downstream from Superior Street Bridge in Alma, 0.6 mi (1.0 km) downstream from municipal reservoir, and 38 mi (61 km) upstream from mouth.

DRAINAGE AREA.--288 mi² (746 km²).

PERIOD OF RECORD.--October 1930 to current year. Gage-height records for flood seasons collected in this vicinity 1910-28 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 744: Drainage area. WSP 1307: 1945(M). WSP 1337: 1931, 1932-34(M), 1936, 1939, 1945, 1949.

GAGE.--Water-stage recorder. Datum of gage is 718.37 ft (218.959 m) National Geodetic Vertical Datum of 1929. Prior to Dec. 10, 1930, nonrecording gage at Superior Street Bridge at different datum. Dec. 10, 1930, to June 15, 1938, nonrecording gage at site 70 ft (21 m) downstream from bridge and June 16 to Oct. 25, 1938, nonrecording gage at bridge at present datum.

REMARKS.--Records good except those for the winter period, which are poor. Occasional regulation caused by dam 0.6 mi (1.0 km) above station and by variable backwater from powerplant at St. Louis, 5.2 mi (8.4 km) below station. About 3.6 ft³/s (0.10 m³/s) diverted above station for municipal and industrial use; sewage effluent is returned below station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--50 years, 212 ft³/s (6.004 m³/s), 10.00 in/yr (254 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,400 ft³/s (125 m³/s) Mar. 19, 1948, gage height, 10.81 ft (3.295 m); minimum daily, 0.40 ft³/s (0.011 m³/s) Sept. 6, 1964, caused by closing dam during construction of waterworks.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 814 ft³/s (23.1 m³/s) Mar. 21, gage height, 5.27 ft (1.606 m); minimum, 27 ft³/s (0.76 m³/s) Aug. 27, 30; minimum gage height, 0.63 ft (0.192 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	35	114	230	311	128	128	287	321	178	157	92	43
2	35	82	220	280	127	126	287	322	185	146	70	56
3	37	95	221	240	126	124	299	317	206	132	80	58
4	39	116	199	220	125	122	445	302	198	129	85	63
5	39	103	176	185	124	120	461	262	188	148	75	62
6	40	98	182	150	123	119	441	226	203	145	57	56
7	42	94	147	135	122	98	442	210	225	150	47	63
8	43	97	141	130	120	102	449	198	348	121	56	58
9	43	107	161	121	120	156	546	189	339	97	52	51
10	45	114	156	155	118	135	536	183	336	97	67	55
11	47	107	180	200	117	154	498	190	326	79	69	69
12	50	107	193	230	116	148	555	169	285	94	60	71
13	50	93	162	200	116	132	547	183	231	121	54	89
14	76	93	144	180	115	114	498	198	191	128	53	83
15	104	101	123	170	115	135	529	197	177	108	47	123
16	93	114	148	166	114	182	485	187	178	103	43	142
17	88	115	145	162	113	406	430	194	179	95	42	154
18	77	118	87	160	112	444	401	246	164	87	59	161
19	87	128	88	155	112	464	376	247	178	96	58	179
20	62	108	96	150	115	635	349	272	146	109	54	168
21	73	134	95	148	118	781	331	280	188	116	48	168
22	94	131	96	146	143	655	310	258	188	105	50	128
23	87	174	116	144	170	598	287	210	157	109	52	188
24	90	187	211	142	188	532	282	179	152	107	70	208
25	92	206	421	140	192	470	278	175	136	91	77	220
26	104	242	423	138	200	406	280	172	119	80	54	217
27	111	234	457	137	130	353	290	156	114	106	37	196
28	101	231	494	136	122	309	288	137	144	138	32	151
29	107	252	466	134	124	296	303	141	161	139	34	150
30	97	250	409	132	---	283	314	157	159	128	29	111
31	98	---	349	130	---	279	---	156	---	120	33	---
TOTAL	2186	4145	6736	5227	3765	9006	11824	6634	5979	3581	1736	3541
MEAN	70.5	138	217	169	130	291	394	214	199	116	56.0	118
MAX	111	252	494	311	200	781	555	322	348	157	92	220
MIN	35	82	87	121	112	98	278	137	114	79	29	43
CFSM	.25	.48	.75	.59	.45	1.01	1.37	.74	.69	.40	.19	.41
IN.	.28	.54	.87	.68	.49	1.16	1.53	.86	.77	.46	.22	.46

CAL YR 1979 TOTAL 70148 MEAN 192 MAX 768 MIN 31 CFSM .67 IN 9.06
WTR YR 1980 TOTAL 64360 MEAN 176 MAX 781 MIN 29 CFSM .61 IN 8.31

04155500 PINE RIVER NEAR MIDLAND, MI

LOCATION.--Lat 43°33'52", long 84°22'09", in SW¼ NW¼ sec.4, T.13 N., R.1 E., Midland County, Hydrologic Unit 04080202, on left bank at downstream side of bridge on Meridian Road, 7.2 mi (11.6 km) southwest of Midland, and 7.8 mi (12.6 km) upstream from Chippewa River.

DRAINAGE AREA.--390 mi² (1,010 km²), approximately.

PERIOD OF RECORD.--May 1934 to September 1938, February 1948 to current year.

REVISED RECORDS.--WSP 1207: Drainage area. WSP 1307: 1935(M). WSP 1337: 1936-38, 1948-49.

GAGE.--Water-stage recorder. Datum of gage is 623.94 ft (190.177 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1938, nonrecording gage at same site, at datum 5.55 ft (1.692 m) lower. Feb. 3, 1948, to Dec. 13, 1951, nonrecording gage at present site and datum.

REMARKS.--Records good except those for the winter period, which are poor. Regulation at low and medium flows by hydroelectric powerplant at St. Louis. Some diversion above station for irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--36 years, 292 ft³/s (8.269 m³/s), 10.17 in/yr (258 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,360 ft³/s (180 m³/s) Mar. 20, 1948, gage height, 10.00 ft (3.048 m), from graph based on gage readings; maximum gage height, 12.08 ft (3.682 m) Feb. 2, 1968, backwater from ice; minimum discharge, not determined.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,290 ft³/s (64.9 m³/s) Mar. 22, gage height, 6.27 ft (1.911 m), only peak above base of 1,200 ft³/s (34.0 m³/s); minimum, 10 ft³/s (0.28 m³/s) Aug. 19; minimum gage height, 2.15 ft (0.655 m) Oct. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	96	77	296	344	130	130	352	398	125	117	145	53
2	115	159	319	282	130	130	417	412	164	137	170	61
3	112	97	245	290	130	130	376	363	182	98	55	96
4	80	59	252	270	130	130	742	308	198	138	50	98
5	51	122	151	238	130	130	872	321	223	53	78	89
6	68	127	182	270	130	130	666	273	166	95	114	106
7	73	109	243	290	130	130	644	194	311	93	97	58
8	78	103	188	300	130	130	659	173	412	145	107	61
9	86	95	163	250	130	130	981	169	539	221	220	121
10	88	101	215	220	130	130	963	166	457	74	129	105
11	90	105	196	200	130	130	766	120	415	153	185	59
12	64	98	149	185	130	130	765	165	382	73	133	93
13	25	136	216	170	130	130	864	161	331	87	108	121
14	17	111	259	160	130	130	712	152	263	77	83	172
15	14	105	177	150	130	130	739	182	206	149	34	104
16	40	102	157	145	130	140	774	197	189	125	33	145
17	134	87	129	142	130	160	686	181	173	108	32	244
18	86	141	311	140	130	270	528	211	161	141	18	298
19	103	93	289	138	130	1000	493	352	181	54	11	267
20	97	162	378	136	130	1480	466	257	174	51	61	323
21	105	114	287	135	130	1920	385	284	175	62	120	175
22	45	196	216	132	130	2120	372	269	148	142	128	373
23	122	144	122	131	130	1590	361	235	187	123	146	337
24	103	214	[illegible]	130	130	1460	309	197	145	108	39	390
25	71	208	[illegible]	130	130	1350	374	134	153	103	17	345
26	126	294	866	130	130	1170	348	121	188	136	75	380
27	61	312	463	130	130	605	301	118	133	76	108	362
28	117	329	625	130	130	437	367	129	107	81	105	310
29	88	258	598	130	130	397	384	112	87	108	49	183
30	107	377	497	130	---	376	441	119	142	164	90	294
31	114	---	467	130	---	381	---	210	---	125	48	---
TOTAL	2576	4635	9369	5758	3770	16806	17027	6683	6709	3417	2788	5823
MEAN	83.1	155	302	186	130	542	568	216	224	110	89.9	194
MAX	134	377	866	344	130	2120	981	412	539	221	220	390
MIN	14	59	118	130	130	130	301	112	87	51	11	53
CFSM	.21	.40	.77	.48	.33	1.39	1.46	.55	.57	.28	.23	.50
IN.	.25	.44	.89	.55	.36	1.60	1.62	.64	.64	.33	.27	.56

CAL YR 1979 TOTAL 92560 MEAN 254 MAX 2090 MIN 14 CFSM .65 IN 8.83
WTR YR 1980 TOTAL 85361 MEAN 233 MAX 2120 MIN 11 CFSM .60 IN 8.14

04156000 TITTABAWASSEE RIVER AT MIDLAND, MI

LOCATION.--Lat 43°35'43", long 84°14'08", in NW¼ NE¼ sec.28, T.14 N., R.2 E., Midland County, Hydrologic Unit 04080201, on right bank 2,000 ft (610 m) downstream from dam at Dow Chemical Co. powerplant in Midland, 0.7 mi (1.1 km) upstream from Bullock Creek, 1.4 mi (2.3 km) downstream from Chippewa River and 23 mi (37 km) upstream from mouth.

DRAINAGE AREA.--2,400 mi^2 (6,200 km^2), approximately.

PERIOD OF RECORD.--March 1936 to current year. Gage-height records for flood seasons collected in this vicinity 1910-.., 1928, and since 1946 are contained in reports of U.S. Weather Bureau.

REVISED RECORDS.--WSP 1045: 1945. WSP 1144: 1948.

GAGE.--Water-stage recorder. Datum of gage is 580.28 ft (176.869 m) National Geodetic Vertical Datum of 1929. Prior to Sept. 30, 1955, at datum 10.00 ft (3.048 m) higher.

REMARKS.--Records poor. Water is diverted from river a short distance above station for industrial use. Small part returned to river 0.25 mi (0.4 km) below station,remainder returned 1 mi (1.6 km) below. Extremes and daily discharges not adjusted for diversion. Prior to May 20, 1970, discharge below 4,000 ft^3/s (113 m^3/s) regulated by dam 2,000 ft (610 m) above station; fixed crest dam since. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--44 years, 1,647 ft^3/s (46.64 m^3/s), 9.32 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 34,000 ft^3/s (963 m^3/s) Mar. 21, 1948, gage height, 29.50 ft (8.992 m); minimum, 39 ft^3/s (1.10 m^3/s) Oct. 12, 1942; minimum daily, 111 ft^3/s (3.14 m^3/s) Aug. 21, 1949; minimum gage height, 9.04 ft (2.755 m) Aug. 19, 1954, caused by bridge construction above station.

EXTREMES OUTSIDE PERIOD OF RECORD.--Maximum stage known since at least 1907, 29.7 ft (9.05 m) Mar. 28, 1916, discharge, 34,800 ft^3/s (986 m^3/s), from information by U.S. Weather Bureau.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 6,090 ft^3/s (172 m^3/s) Apr. 10, gage height, 16.38 ft (4.993 m), no peak above base of 7,000 ft^3/s (198 m^3/s); minimum, 288 ft^3/s (8.16 m^3/s) Aug. 26, gage height, 9.41 ft (2.868 m); minimum daily, 355 ft^3/s (10.1 m^3/s) Oct. 7.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	390	902	960	1310	790	440	2070	3840	740	1730	620	385
2	500	978	570	1500	500	360	2210	3330	1220	1700	515	500
3	499	500	1030	1520	400	580	2230	2760	1140	1640	440	818
4	475	360	1140	1100	450	960	2570	1760	1040	818	505	750
5	458	615	1010	560	560	840	3230	1940	1090	460	510	645
6	383	755	881	380	450	820	2720	2120	1580	430	530	475
7	355	570	1080	640	450	800	2250	1880	1340	535	520	400
8	449	545	848	1100	550	400	2850	1560	2770	665	555	475
9	627	550	595	990	380	360	4460	1590	2970	780	530	525
10	521	485	836	930	360	760	6050	916	2770	680	535	655
11	516	430	1340	1020	470	895	5450	795	1940	650	605	848
12	628	545	1680	970	460	1080	4920	888	1390	515	610	705
13	439	580	1070	923	400	1050	4740	1150	1170	480	575	1240
14	363	923	870	1490	470	1030	4470	1520	895	765	575	1810
15	529	848	540	1690	500	500	4920	1810	780	690	675	1460
16	637	725	600	1710	410	460	5100	1800	1040	590	465	1500
17	555	545	720	2040	360	1700	4640	1050	1030	765	400	2040
18	687	555	1080	2250	380	3200	4280	2130	994	790	625	2640
19	665	765	650	1720	800	3660	4090	4160	1540	510	640	2510
20	540	1110	1000	890	1150	3790	2300	3970	1570	425	530	2190
21	473	1180	960	1110	1340	3980	2420	3560	854	675	575	1200
22	595	665	660	1350	1620	4920	2590	3450	570	765	610	1580
23	790	938	550	1360	790	4230	2480	1890	1090	525	510	2400
24	923	715	1440	1550	500	3640	2430	1170	1160	455	435	2920
25	916	715	2410	1590	850	3260	2650	867	902	685	480	2640
26	600	1510	3220	800	570	2630	1960	780	923	530	445	2170
27	495	2050	2810	360	650	2710	1500	1340	1100	495	485	1440
28	440	2040	2610	730	800	2280	2230	1480	730	710	505	938
29	680	1980	1970	800	800	1580	2890	916	1130	735	485	1180
30	705	1990	1350	780	---	1390	3970	1000	1740	790	460	1160
31	730	---	1940	740	---	1890	---	806	---	755	400	---
TOTAL	17543	27059	38420	35943	18540	56185	100670	58228	39240	22738	16350	40199
MEAN	566	902	1239	1159	639	1812	3356	1878	1308	733	527	1340
MAX	923	2050	3220	2250	1620	4920	6050	4160	2970	1730	675	2920
MIN	355	360	550	360	360	360	1500	780	570	425	400	385
†	25.6	23.6	27.7	27.2	18.4	22.8	26.5	20.9	26.9	34.0	32.5	30.7
MEAN‡	591	926	1267	1187	658	1835	3382	1899	1335	768	560	1371
CFSM‡	.25	.39	.53	.49	.27	.76	1.41	.79	.56	.32	.23	.57
IN‡	.28	.43	.61	.57	.30	.88	1.57	.91	.62	.37	.27	.64

CAL YR 1979 TOTAL 539091 MEAN 1477 MAX 9390 MIN 253 MEAN‡ 1503 CFSM‡ .63 IN‡ 8.51
WTR YR 1980 TOTAL 471133 MEAN 1287 MAX 6050 MIN 355 MEAN‡ 1314 CFSM‡ .55 IN‡ 7.45

† Diversion in cubic feet per second, for industrial use; furnished by Dow Chemical Co.

‡ Adjusted for diversion made by Dow Chemical Co.

04157000 SAGINAW RIVER AT SAGINAW, MI
(National stream-quality accounting network station)

LOCATION.--Lat 43°24'46", long 83°57'47", in NW¼ SE¼ sec.26, T.12 N., R.4 E., Saginaw County, Hydrologic Unit 04080206, on right bank 1,000 ft (305 m) downstream from bridge on Rust Avenue in Saginaw, 1.9 mi (3.1 km) downstream from Tittabawassee River and 20.3 mi (32.7 km) upstream from mouth. Water quality sampling site at downstream side of bridge on Rust Avenue. Water quality monitor located 1,000 ft (305 m) downstream on downstream side of bridge on Court Street.

DRAINAGE AREA.--6,060 mi² (15,700 km²), approximately.

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--1904, 1908-9, 1912-13, 1916, 1918-19, 1929-30, and 1942 (flood discharge for certain periods only) in WSP 1084; December 1942 to current year (high-water periods only); no high water 1944, 1949, 1953, 1955, 1958, 1961, 1963, 1964, 1966. Gage-height records for flood seasons collected in this vicinity 1910-20, and for entire years since 1921 are contained in reports of U.S. Weather Bureau.

GAGE.--Water-stage recorder. Datum of gage is 565.11 ft (172.246 m), International Great Lakes datum. Prior to Oct. 1, 1972, nonrecording gage at site 1.9 mi (3.1 km) downstream at same datum. Auxiliary water-stage recorder on right bank near Alpin Beach, 19.9 mi (32.0 km) downstream.

REMARKS.--Water-discharge records good. Considerable diversion through metropolitan area of Saginaw. National Weather Service gage-height telemark at station.

COOPERATION.--Auxiliary gage-height record furnished by NOAA-National Ocean Survey.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 68,000 ft³/s (1,930 m³/s) Mar. 30, 1904, gage height, 24.9 ft (7.59 m), site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum daily discharge, 13,600 ft³/s (385 m³/s) Apr. 17; maximum daily gage height, 15.95 ft (4.862 m) Apr. 14.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1						---	---					
2						---	---					
3						---	---					
4						---	---					
5						---	---					
6						---	10100					
7						---	11000					
8						---	---					
9						---	10500					
10						---	11200					
11						---	11100					
12						---	11400					
13						---	---					
14						---	10900					
15						---	11500					
16						---	13100					
17						---	13600					
18						---	11500					
19						---	10600					
20						---	---					
21						10700	---					
22						10100	---					
23						10300	---					
24						---	---					
25						---	---					
26						---	---					
27						---	---					
28						---	---					
29						---	---					
30						---	---					
31						---	---					

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: November 1974 to current year.
WATER TEMPERATURES: November 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Nov. 6, 1976.

REMARKS.--Interruptions in the daily record were due to malfunctions of the instrument. Instantaneous water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum recorded, 1,230 micromhos Jan. 5, 1977; minimum recorded, 224 micromhos Mar. 13, 1977.
WATER TEMPERATURES: Maximum, 30.0ºC July 10, 14, 20, 1977; minimum, 0.0ºC on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 16...	1430	426	781	7.9	11.0	9.4	86	1200	140	270	99	69
NOV 27...	1400	2510	700	7.8	5.0	10.6	84	550	480	280	100	74
DEC 19...	1000	--	805	7.8	.0	13.2	92	82	23	310	84	81
JAN 23...	1100	--	724	7.8	.0	11.5	81	160	K52	290	100	80
FEB 27...	1400	--	642	7.6	.0	12.0	83	88	160	250	64	70
MAR 26...	1200	7860	527	7.6	2.5	11.8	86	190	100	210	61	57
APR 09...	1300	9970	562	7.7	9.0	10.7	95	K690	340	240	120	66
MAY 21...	1400	8890	586	7.8	19.0	9.7	105	180	320	250	78	68
JUN 18...	1200	1010	755	8.0	20.0	9.8	108	K80	K31	280	83	77
JUL 16...	1300	1020	754	8.3	28.0	8.0	104	K620	--	260	89	69
AUG 21...	1030	1800	682	8.1	26.0	9.2	1	510	93	270	85	72
SEP 18...	1330	6130	589	7.9	18.5	7.1	0	K7800	860	220	56	55

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 16...	24	--	53	1.4	29	4.2	210	0	170	4.2	63
NOV 27...	22	0	46	1.2	35	3.1	210	0	170	5.3	60
DEC 19...	25	--	48	1.2	25	4.1	270	0	220	6.8	73
JAN 23...	22	0	34	.9	27	2.6	230	0	190	5.8	64
FEB 27...	19	0	31	.8	21	3.3	230	0	190	9.2	60
MAR 26...	16	--	20	.6	17	3.6	180	0	150	7.2	48
APR 09...	18	0	18	.5	14	3.5	150	0	120	4.8	50
MAY 21...	19	0	23	.6	17	2.7	210	0	170	5.3	56
JUN 18...	22	--	41	1.1	24	3.0	250	0	210	3.9	63
JUL 16...	21	--	55	1.5	31	3.7	210	0	170	1.7	59
AUG 21...	23	0	44	1.2	26	4.1	230	0	190	2.9	55
SEP 18...	20	0	35	1.0	25	3.9	200	0	160	3.9	40

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER DAY)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, AMMONIA DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
16...	100	.3	3.9	497	425	572	.76	.70	.840	.620	1.0
NOV											
27...	84	.2	5.3	428	402	2900	.83	.80	.230	.000	.28
DEC											
19...	91	.3	5.6	504	467	--	1.4	1.4	1.100	.920	1.3
JAN											
23...	75	.2	7.3	446	408	--	2.0	2.0	.680	.590	.82
FEB											
27...	59	.2	6.7	403	367	--	1.0	1.0	.460	.430	.56
MAR											
26...	43	.2	5.8	323	201	6860	4.4	1.7	.610	.540	.74
APR											
09...	48	.2	4.5	405	298	10900	5.0	3.5	.170	.070	.21
MAY											
21...	49	.2	4.1	414	333	9940	2.1	1.9	.070	.070	.02
JUN											
19...	86	.3	2.8	541	424	1480	2.1	2.0	.070	.050	.08
JUL											
16...	110	.3	2.2	548	426	1510	.78	.78	.040	.000	.05
AUG											
21...	96	.4	4.2	504	415	2450	.58	.57	.200	.060	.24
SEP											
18...	58	.1	4.5	356	319	5890	1.6	.94	.190	--	.22

DATE	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, TOTAL (MG/L AS PO4)	PHOS- PHORUS, DIS- SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI- MENT, SUS- PENDED (MG/L)	SEDI- MENT DIS- CHARGE, SUS- PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
16...	1.3	2.1	2.9	13	.180	.55	.080	--	25	29	100
NOV											
27...	.87	1.1	1.9	8.5	--	.43	.220	6.7	26	176	100
DEC											
19...	1.1	2.2	3.6	16	.100	.31	.070	5.3	21	--	--
JAN											
23...	.62	1.3	3.3	15	.090	.28	.060	--	--	--	--
FEB											
27...	.01	.47	1.5	6.5	.010	.03	.010	4.5	--	--	--
MAR											
26...	.59	1.2	5.6	25	.180	.55	.060	--	28	594	100
APR											
09...	.39	.56	5.6	25	.240	.74	.040	--	91	2450	100
MAY											
21...	1.0	1.1	3.2	14	.030	.09	.030	13	38	912	100
JUN											
19...	1.1	1.2	3.3	15	.150	.46	.040	9.3	47	128	100
JUL											
16...	1.4	1.4	2.2	9.7	.170	.52	.050	13	44	121	100
AUG											
21...	1.3	1.5	2.1	9.2	.090	.28	.060	--	56	272	100
SEP											
18...	.64	.82	2.4	11	.250	.77	.060	--	78	1290	100

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)
OCT 16...	1430	6	4	--	90	--	2	20	<10	1
JAN 23...	1100	2	0	100	60	--	1	--	30	--
APR 09...	1300	1	1	100	50	0	0	30	30	0
SEP 18...	1330	4	4	100	100	0	0	40	10	1

DATE	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
OCT 16...	1	8	4	780	20	8	0	50	10	.2
JAN 23...	4	--	4	400	20	4	1	40	30	.3
APR 09...	0	10	3	2800	50	9	1	110	30	.2
SEP 18...	0	16	2	2600	20	10	2	140	20	.3

DATE	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
OCT 16...	<.1	12	9	0	0	0	30	6	9.1	1.0
JAN 23...	.1	6	6	0	0	0	30	40	7.6	.5
APR 09...	.2	5	3	0	0	0	--	180	16	.9
SEP 18...	.3	8	6	0	0	0	90	10	--	2.2

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
NOV 27...	1400	42	608	5.04	5.83	1.30	.000
JUL 16...	1300	28	11330	7.17	9.21	.180	.360
AUG 21...	1030	37	5000	18.3	24.8	1.30	.000

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 14.78	MAR 22.79	JUN 1.79	JUN 27.79	JUL 26.79	AUG 21.79
TIME	1130	1100	0930	1300	1030	1430
TOTAL CELLS/ML	4600	450	33000	67000	27000	11000
DIVERSITY: DIVISION	1.5	1.2	1.2	1.7	1.3	1.7
.CLASS	1.6	1.2	1.3	1.7	1.3	1.7
..ORDER	2.2	1.8	1.5	2.3	1.7	2.1
...FAMILY	2.6	2.8	2.4	2.8	2.1	2.6
....GENUS	3.0	3.1	2.5	3.0	2.5	3.4

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	170	1	*	0	--	-	--	-
...CHLOROCOCCACEAE												
....CHLOROCOCCUM	--	-	--	-	170	1	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	3000	4	1000	4	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	11000#	34	--	-	--	-	--	-
...OOCYSTACEAE												
....ANKISTRODESMUS	320	7	--	-	1000	3	660	1	*	0	400	4
....CHLORELLA	--	-	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	39	1	--	-	--	-	--	-	--	-	67	1
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-	67	1
....DICTYOSPHAERIUM	--	-	--	-	2800	8	6200	9	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-	270	2
....OOCYSTIS	160	3	--	-	--	-	--	-	--	-	67	1
....SELENASTRUM	39	1	--	-	350	1	--	-	410	2	470	4
....TETRAEDRON	39	1	--	-	--	-	*	0	200	1	67	1
....TREUBARIA	39	1	--	-	--	-	--	-	--	-	67	1
....WESTELLA	--	-	--	-	--	-	--	-	410	2	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-	130	1
....CRUCIGENIA	--	-	--	-	--	-	1300	2	810	3	270	2
....SCENEDESMUS	240	5	15	3	2800	8	9800	15	14000#	51	2800#	25
....TETRASTRUM	160	3	--	-	--	-	1300	2	410	2	270	2
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	160	3	10	2	690	2	980	1	410	2	870	8
....CHLOROGONIUM	--	-	--	-	170	1	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	2100#	47	20	4	--	-	--	-	1800	7	3000#	27
....MELOSIRA	--	-	50	11	--	-	*	0	--	-	130	1
....STEPHANODISCUS	--	-	--	-	11000#	32	19000#	28	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....RHOICOSPHENIA	--	-	10	2	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	15	3	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	5	1	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	39	1	5	1	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	--	-	350	1	--	-	--	-	--	-
....FRAGILARIA	--	-	35	8	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	15	3	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	79	2	5	1	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	240	5	150#	33	--	-	--	-	--	-	--	-
...NITZSCHIACEAE												
....NITZSCHIA	160	3	5	1	--	-	3600	5	810	3	130	1
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	5	1	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	120	3	--	-	350	1	--	-	--	-	67	1

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 14,78 1130		MAR 22,79 1100		JUN 1,79 0930		JUN 27,79 1300		JUL 26,79 1030		AUG 21,79 1430	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	350	8	--	-	--	-	--	-	*	0	270	2
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	980	1	*	0	940	8
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	410	2	--	-
....ANACYSTIS	--	-	15	3	2200	7	5600	8	1100	4	270	2
..HORMOGONALES												
...NOSTOCACEAE												
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	--	-	--	-	13000#	20	4900#	18	--	-
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	160	3	--	-	--	-	--	-	200	1	130	1
....EUTREPTIA	--	-	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-	130	1
....TRACHELOMONAS	120	3	91#	20	--	-	*	0	--	-	130	1
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 27,79 1400	MAR 26,80 1200	MAY 21,80 1400	JUL 16,80 1300	AUG 21,80 1030	SEP 18,80 1330
TOTAL CELLS/ML	5400	2700	6000	95000	35000	18000
DIVERSITY: DIVISION	1.4	1.5	1.3	1.6	1.1	1.6
.CLASS	1.4	1.5	1.3	1.6	1.1	1.6
..ORDER	0.0	2.3	1.9	1.8	1.6	2.0
...FAMILY	0.0	2.8	2.3	2.2	1.8	2.7
....GENUS	0.0	3.1	2.9	2.9	2.5	3.0

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...CHARACIACEAE												
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE												
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE												
....COELASTRUM	--	-	--	-	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE												
....PEDIASTRUM	--	-	--	-	--	-	4700	5	--	-	--	-
...MICRACTINIACEAE												
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-	140	1
....MICRACTINIUM	--	-	--	-	--	-	2500	3	--	-	820	5
...OOCYSTACEAE												
....ANKISTRODESMUS	1100#	20	280	11	210	4	1200	1	460	1	*	0
....CHLORELLA	240	5	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-	*	0
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-	*	0
....DICTYOSPHAERIUM	--	-	--	-	--	-	5300	6	--	-	--	-
....KIRCHNERIELLA	--	-	61	2	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	81	3	170	3	620	1	1200	3	620	3
....SELENASTRUM	--	-	--	-	85	1	930	1	920	3	--	-
....TETRAEDRON	--	-	--	-	43	1	--	-	460	1	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-	*	0
....WESTELLA	--	-	--	-	--	-	--	-	1800	5	--	-
...SCENEDESMACEAE												
....ACTINASTRUM	--	-	81	3	--	-	2500	3	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	2500	3	690	2	270	2
....SCENEDESMUS	650	12	81	3	850	14	930	1	1800	5	1600	9
....TETRASTRUM	330	6	--	-	--	-	1200	1	--	-	--	-
..TETRASPORALES												
...COCCOMYXACEAE												
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-	140	1
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	160	3	470#	17	85	1	1600	2	230	1	550	3
....CHLOROGONIUM	--	-	--	-	130	2	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	1200#	22	850#	32	2600#	43	29000#	31	17000#	50	5300#	29
....MELOSIRA	--	-	--	-	380	6	9600	10	3700	11	750	4
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....RHOICOSPHENIA	--	-	20	1	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	--	-	--	-	--	-	--	-
....CYMBELLA	--	-	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	61	2	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....ASTERIONELLA	--	-	--	-	340	6	--	-	--	-	--	-
....FRAGILARIA	--	-	20	1	--	-	--	-	--	-	--	-
....SYNEDRA	200	4	81	3	130	2	620	1	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	410	8	100	4	--	-	--	-	--	-	*	0
...NITZSCHIACEAE												
....NITZSCHIA	770	14	81	3	300	5	620	1	3500	10	480	3
...SURIRELLACEAE												
....CYMATOPLEURA	--	-	--	-	--	-	--	-	--	-	--	-
....SURIRELLA	--	-	--	-	43	1	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-	--	-

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 27,79 1400		MAR 26,80 1200		MAY 21,80 1400		JUL 16,80 1300		AUG 21,80 1030		SEP 18,80 1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE	41	1	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-	*	0
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	--	-	*	0	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	30000#	31	--	-	--	-
....ANACYSTIS	--	-	--	-	640	11	930	1	2800	8	270	2
..HORMOGONALES												
...NOSTOCACEAE												
....APHANIZOMENON	--	-	--	-	--	-	--	-	--	-	5100#	28
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	--	-	--	-	--	-	--	-	1600	9
....SCHIZOTHRIX	330	6	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	--	-	--	-	--	-	--	-	*	0
....EUTREPTIA	41	1	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	410#	15	43	1	*	0	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	20	1	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM, EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED, LESS THAN 1/2%

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	833	813	824	775	656	717	652	596	632	931	780	816
2	876	823	832	723	708	719	693	601	649	853	787	817
3	934	869	907	748	597	642	781	696	745	839	815	827
4	923	851	893	675	659	668	882	707	799	960	797	861
5	899	761	822	641	619	625	745	674	716	932	905	919
6	802	789	799	777	634	720	744	704	718	929	882	911
7	805	786	793	915	703	789	732	705	722	918	763	842
8	837	773	803	719	654	691	724	679	709	790	714	755
9	861	785	827	722	688	704	729	695	718	741	688	713
10	913	838	884	749	694	728	800	723	747	744	694	712
11	874	665	779	749	706	725	818	773	794	719	684	695
12	750	656	672	769	699	728	825	730	774	732	692	714
13	765	710	742	853	713	782	726	645	694	798	711	749
14	761	722	746	841	712	775	695	646	666	---	---	---
15	740	628	666	723	685	700	735	654	721	---	---	---
16	778	672	725	745	651	700	741	716	730	---	---	---
17	876	798	833	732	677	707	757	720	741	---	---	---
18	822	739	770	713	663	687	892	760	808	---	---	---
19	753	671	698	717	649	675	896	754	844	---	---	---
20	827	648	748	---	---	---	762	728	746	---	---	---
21	805	755	781	---	---	---	859	736	800	---	---	---
22	786	685	728	---	---	---	795	722	754	---	---	---
23	901	699	750	---	---	---	806	726	754	---	---	---
24	828	774	797	---	---	---	780	703	755	911	703	754
25	778	703	746	---	---	---	847	702	748	942	646	764
26	725	607	664	---	---	---	746	649	690	747	669	702
27	690	606	644	---	---	---	725	664	689	756	719	740
28	718	659	699	651	582	633	738	686	728	809	740	773
29	719	675	698	664	580	636	785	727	754	924	820	882
30	874	695	815	673	593	638	798	786	791	902	760	830
31	901	706	785	---	---	---	933	787	886	867	748	793
MONTH	934	606	770				933	596	743			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	873	779	833	840	701	736	634	558	590	688	603	656
2	895	777	828	845	750	787	600	574	589	733	686	707
3	875	812	850	814	749	776	613	564	591	733	676	702
4	872	809	833	1040	824	910	605	562	585	721	655	681
5	991	891	943	920	698	800	582	551	563	866	576	677
6	1010	954	986	785	716	743	568	535	551	704	618	660
7	950	883	911	849	758	781	559	532	544	731	624	656
8	953	877	918	870	745	796	572	535	552	---	---	---
9	962	909	935	870	767	818	557	548	551	---	---	---
10	969	892	932	854	792	818	604	563	584	---	---	---
11	895	873	882	913	857	870	618	559	589	---	---	---
12	1060	885	965	910	791	856	612	554	584	---	---	---
13	1070	955	1000	945	823	885	606	550	589	---	---	---
14	957	881	913	945	783	845	620	579	594	---	---	---
15	991	907	946	944	780	855	620	571	602	---	---	---
16	954	887	929	937	843	863	648	608	631	---	---	---
17	956	856	910	1020	861	911	684	653	664	---	---	---
18	917	873	887	1010	598	766	678	590	627	---	---	---
19	969	925	946	587	491	517	630	576	594	---	---	---
20	1180	972	1110	487	439	452	592	580	585	---	---	---
21	1110	765	939	444	426	435	600	582	592	---	---	---
22	814	772	797	490	442	460	611	554	594	---	---	---
23	832	699	784	505	481	490	643	589	611	---	---	---
24	808	780	791	526	508	519	660	607	640	---	---	---
25	797	767	779	538	513	523	687	592	639	---	---	---
26	841	723	795	545	496	519	652	542	613	---	---	---
27	739	654	681	544	509	526	633	559	604	---	---	---
28	741	698	720	545	536	541	639	556	617	---	---	---
29	774	722	743	593	539	556	650	549	624	---	---	---
30	---	---	---	565	544	554	646	603	629	---	---	---
31	---	---	---	586	555	574	---	---	---	---	---	---
MONTH	1180	654	879	1040	426	693	687	532	597			

04157000 SAGINAW RIVER AT SAGINAW, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1										---	---	---
2										---	---	---
3										---	---	---
4										---	---	---
5										---	---	---
6										---	---	---
7										---	---	---
8										---	---	---
9										---	---	---
10										---	---	---
11										---	---	---
12										---	---	---
13										---	---	---
14										---	---	---
15										---	---	---
16										---	---	---
17										---	---	---
18										---	---	---
19										---	---	---
20										---	---	---
21										---	---	---
22										---	---	---
23										689	647	672
24										743	671	705
25										808	738	770
26										831	800	814
27										948	782	891
28										952	916	934
29										923	915	918
30										935	915	927
31										---	---	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	20.0	19.0	19.0	11.5	9.5	10.5	1.5	1.0	1.5	.0	.0	.0
2	19.0	18.5	18.5	10.5	9.5	10.0	1.0	.0	.0	1.5	.0	1.0
3	18.5	17.5	18.0	9.5	7.5	8.5	.0	.0	.0	1.0	.0	.0
4	17.5	17.5	17.5	7.5	7.5	7.5	.0	.0	.0	.0	.0	.0
5	17.0	16.0	16.5	7.5	7.0	7.0	1.0	.0	.0	.0	.0	.0
6	16.0	15.0	15.5	7.5	7.0	7.5	1.5	1.0	1.0	.0	.0	.0
7	15.0	14.0	14.5	7.0	6.0	6.5	2.0	1.0	1.5	.0	.0	.0
8	14.0	13.0	13.5	6.0	5.0	5.5	1.5	.0	.5	.0	.0	.0
9	13.5	12.0	12.5	5.5	5.0	5.0	.5	.0	.0	.0	.0	.0
10	12.0	12.0	12.0	5.0	4.5	4.5	1.0	.0	.5	.0	.0	.0
11	12.0	10.5	11.0	4.5	4.0	4.0	3.0	.5	1.0	.0	.0	.0
12	10.5	10.0	10.5	4.0	3.5	4.0	3.0	1.5	2.0	.0	.0	.0
13	10.0	9.5	10.0	4.0	3.5	4.0	1.5	1.0	1.5	.0	.0	.0
14	9.5	9.0	9.0	4.0	3.5	4.0	1.5	.0	.5	.0	.0	.0
15	9.5	9.0	9.0	4.0	3.5	4.0	.0	.0	.0	---	---	---
16	11.5	9.5	10.5	4.0	3.5	3.5	.5	.0	.0	---	---	---
17	12.0	11.0	12.0	4.0	3.5	4.0	.0	.0	.0	---	---	---
18	13.5	12.0	12.5	5.0	4.0	4.5	.0	.0	.0	---	---	---
19	14.0	12.5	13.5	6.5	5.0	5.5	.0	.0	.0	---	---	---
20	15.0	13.5	14.0	---	---	---	.0	.0	.0	---	---	---
21	16.0	15.0	15.5	---	---	---	1.0	.0	.5	---	---	---
22	17.5	16.0	17.0	---	---	---	1.0	1.0	1.0	---	---	---
23	18.0	16.5	17.0	---	---	---	1.0	1.0	1.0	.0	.0	.0
24	16.5	14.0	15.5	---	---	---	1.5	1.0	1.5	.0	.0	.0
25	14.0	10.0	12.0	---	---	---	---	---	---	.0	.0	.0
26	10.0	8.5	9.5	---	---	---	1.0	.0	.5	.0	.0	.0
27	8.5	8.0	8.0	5.0	4.5	5.0	.0	.0	.0	.0	.0	.0
28	8.0	8.0	8.0	5.0	4.0	4.5	.0	.0	.0	.0	.0	.0
29	8.0	7.5	8.0	4.0	3.0	3.5	.0	.0	.0	.0	.0	.0
30	8.0	8.0	8.0	3.0	1.5	2.0	.0	.0	.0	.0	.0	.0
31	9.0	8.0	8.5	---	---	---	.0	.0	.0	.0	.0	.0
MONTH	20.0	7.5	13.0									

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	4.5	4.5	4.5	15.0	12.5	13.5
2	.0	.0	.0	.0	.0	.0	6.5	5.0	5.5	16.0	15.0	15.5
3	.0	.0	.0	.0	.0	.0	6.5	5.5	6.0	15.0	13.0	13.5
4	.0	.0	.0	.0	.0	.0	6.0	4.5	5.5	14.0	12.5	13.0
5	.0	.0	.0	.0	.0	.0	5.0	4.0	4.5	14.0	13.5	14.0
6	.0	.0	.0	.0	.0	.0	6.5	5.0	6.0	15.0	14.0	14.5
7	.0	.0	.0	.0	.0	.0	8.0	6.5	7.0	15.0	15.0	15.0
8	.0	.0	.0	.0	.0	.0	10.5	7.5	8.5	14.5	14.0	14.5
9	.0	.0	.0	.0	.0	.0	11.5	10.0	11.0	---	---	---
10	.0	.0	.0	.0	.0	.0	12.5	11.0	11.5	---	---	---
11	.0	.0	.0	.0	.0	.0	13.5	12.0	12.5	---	---	---
12	.0	.0	.0	.0	.0	.0	13.5	12.0	13.0	---	---	---
13	.0	.0	.0	.0	.0	.0	13.0	11.0	11.5	---	---	---
14	.0	.0	.0	.0	.0	.0	11.0	9.5	10.0	---	---	---
15	.0	.0	.0	.5	.0	.0	11.5	10.0	10.5	---	---	---
16	.0	.0	.0	1.0	.0	.0	11.5	10.0	11.0	---	---	---
17	.0	.0	.0	1.5	1.0	1.5	12.0	11.5	11.5	---	---	---
18	.0	.0	.0	1.5	.5	1.0	11.5	11.0	11.5	---	---	---
19	.0	.0	.0	1.5	.0	.5	11.5	11.0	11.0	---	---	---
20	.0	.0	.0	2.5	1.0	1.5	12.5	11.5	12.0	---	---	---
21	.0	.0	.0	2.5	.5	1.5	15.0	12.5	13.5	---	---	---
22	.0	.0	.0	2.0	.0	1.0	16.5	14.0	15.0	---	---	---
23	.0	.0	.0	2.0	1.0	1.5	17.5	15.5	16.5	---	---	---
24	.0	.0	.0	2.0	1.5	1.5	17.5	16.5	17.0	---	---	---
25	.0	.0	.0	2.0	1.0	1.5	17.5	16.5	17.0	---	---	---
26	.0	.0	.0	3.0	2.0	2.5	16.5	14.0	14.5	---	---	---
27	.0	.0	.0	3.5	2.5	3.0	13.5	12.0	12.5	---	---	---
28	.0	.0	.0	4.0	3.5	3.5	12.0	11.0	11.5	---	---	---
29	.0	.0	.0	4.0	3.5	4.0	11.5	10.5	11.5	---	---	---
30	---	---	---	4.5	3.5	4.0	13.0	11.5	12.0	---	---	---
31	---	---	---	5.0	4.0	4.5	---	---	---	---	---	---
MONTH	.0	.0	.0	5.0	.0	1.0	17.5	4.0	11.0			

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1										---	---	---
2										---	---	---
3										---	---	---
4										---	---	---
5										---	---	---
6										---	---	---
7										---	---	---
8										---	---	---
9										---	---	---
10										---	---	---
11										---	---	---
12										---	---	---
13										---	---	---
14										---	---	---
15										---	---	---
16										---	---	---
17										---	---	---
18										---	---	---
19										---	---	---
20										---	---	---
21										---	---	---
22										---	---	---
23										20.0	18.0	18.5
24										18.0	17.0	17.0
25										17.0	16.5	16.5
26										16.5	15.0	15.5
27										15.0	13.0	14.0
28										14.0	13.0	13.5
29										15.0	13.0	13.5
30										16.0	15.0	15.0
31										---	---	---

04158500 PIGEON RIVER NEAR OWENDALE, MI

LOCATION.--Lat 43°45'49", long 83°14'46", in SW¼ SE¼ sec.36, T.16 N., R.10 E., Huron County, Hydrologic Unit 04080103, on left bank 600 ft (183 m) downstream from bridge on Kilmanagh Road, 2.5 mi (4.0 km) downstream from confluence of East and West Branches, and 2.5 mi (4.0 km) northeast of Owendale.

DRAINAGE AREA.--53.2 mi^2 (138 km^2).

PERIOD OF RECORD.--October 1952 to current year.

REVISED RECORDS.--WDR MI-78: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m), from topographic map. Prior to June 10, 1954, nonrecording gage at site 600 ft (183 m) upstream at same datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 31.5 ft^3/s (0.892 m^3/s), 8.04 in/yr (204 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,550 ft^3/s (72.2 m^3/s) Mar. 25, 1954, gage height, 10.75 ft (3.277 m), from rating curve extended above 1,200 ft^3/s (34.0 m^3/s), site and datum then in use; minimum, 0.1 ft^3/s (0.003 m^3/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 614 ft^3/s (17.4 m^3/s) Mar. 18, gage height, 8.08 ft (2.463 m) backwater from ice; only peak above base of 500 ft^3/s (14.2 m^3/s); minimum, 1.2 ft^3/s (0.034 m^3/s) Oct. 1; minimum gage height, 2.73 ft (0.832 m) July 19, Aug. 26-28.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.3	3.8	8.2	20	2.8	4.9	79	57	13	7.0	8.7	7.5
2	1.3	4.1	7.1	17	2.8	4.1	66	45	17	5.8	7.4	13
3	1.4	4.2	5.7	14	2.8	4.1	58	38	23	4.9	4.9	8.6
4	1.6	4.2	6.0	12	2.7	4.4	143	30	14	4.4	4.0	4.7
5	2.1	4.0	6.0	11	2.7	4.5	232	26	14	4.2	3.4	3.8
6	2.5	4.1	6.9	9.7	2.7	4.7	97	23	23	4.0	3.3	3.3
7	2.8	4.5	8.0	9.4	2.7	4.7	71	19	54	3.9	2.9	2.9
8	2.8	4.9	9.0	8.6	2.7	4.6	65	17	63	4.4	3.4	2.7
9	2.7	5.8	7.2	8.3	2.7	4.5	79	14	60	4.1	4.5	3.2
10	2.8	3.6	9.4	7.9	2.7	4.7	93	13	40	3.9	3.6	4.0
11	2.0	3.3	8.1	12	2.8	5.4	91	12	38	3.8	3.5	3.4
12	2.1	3.1	8.5	20	2.8	6.6	83	11	20	3.6	3.6	3.0
13	1.9	2.9	8.1	32	2.8	6.3	89	13	11	3.3	3.3	4.9
14	1.8	3.1	7.0	24	2.8	6.4	78	20	12	3.3	3.1	9.6
15	1.8	3.1	6.1	18	2.9	6.4	299	20	23	3.3	2.8	7.6
16	1.8	3.2	6.0	15	2.9	8.0	354	16	13	3.6	2.4	5.9
17	2.3	3.1	5.0	19	3.0	189	138	16	14	4.0	2.2	38
18	2.3	3.1	4.4	32	3.1	490	79	63	12	3.4	2.1	52
19	2.5	3.0	4.4	30	3.2	210	65	91	18	3.0	2.1	33
20	3.0	3.0	4.5	20	3.3	80	59	71	33	3.1	2.1	22
21	2.9	3.1	4.6	16	3.5	45	54	52	30	18	2.1	15
22	2.9	4.6	6.0	15	3.7	37	44	39	24	20	2.4	12
23	3.2	7.6	9.6	11	4.1	33	37	30	18	11	2.3	27
24	3.6	9.4	21	10	4.8	32	30	26	12	5.4	1.9	30
25	3.9	8.6	97	8.0	16	29	29	21	9.8	3.9	1.7	21
26	3.6	8.7	199	6.4	18	27	27	16	7.2	3.8	1.7	21
27	3.6	12	71	4.7	15	42	24	9.6	6.6	6.9	1.7	19
28	3.7	13	44	4.0	10	108	27	11	8.0	11	1.8	15
29	3.7	11	33	3.4	6.0	96	50	9.1	11	7.6	2.2	12
30	3.7	9.6	28	3.1	---	73	63	11	8.6	4.9	25	9.6
31	3.6	---	23	2.8	---	59	---	15	---	4.4	8.6	---
TOTAL	81.2	161.7	671.8	424.3	138.0	1632.3	2703	854.7	650.2	177.9	124.7	414.7
MEAN	2.62	5.39	21.7	13.7	4.76	52.7	90.1	27.6	21.7	5.74	4.02	13.8
MAX	3.9	13	199	32	18	490	354	91	63	20	25	52
MIN	1.3	2.9	4.4	2.8	2.7	4.1	24	9.1	6.6	3.0	1.7	2.7
CFSM	.05	.10	.41	.26	.09	.99	1.69	.52	.41	.11	.08	.26
IN.	.06	.11	.47	.30	.10	1.14	1.89	.60	.45	.12	.09	.29

CAL YR 1979 TOTAL 12464.12 MEAN 34.1 MAX 547 MIN .56 CFSM .64 IN 8.72
WTR YR 1980 TOTAL 8034.50 MEAN 22.0 MAX 490 MIN 1.3 CFSM .41 IN 5.62

04159010 PIGEON RIVER NEAR CASEVILLE, MI
(National stream-quality network station)

LOCATION.--Lat 43°56'22", long 83°14'30" in SW¼ NW¼ sec.31, T.18 N., R.11 E., Huron County, Hydrologic Unit 04080103, at bridge on Kinde Road, 1.5 mi (2.4 km) east of Caseville, and 3.1 mi (5.0 km) upstream from mouth.

DRAINAGE AREA.--125 mi² (324 km²).

PERIOD OF RECORD.--January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to current year.
WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements by a local observer. Water-discharge measurements are made at times of monthly sampling. Biological Data (Phytoplankton) is for the 1979 and 1980 water year.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily recorded, 2000 micromhos Oct. 20, 1979; minimum daily recorded, 175 micromhos Mar. 6, 1979.
WATER TEMPERATURES: Maximum daily recorded, 27.5°C July 7, 1978; minimum daily recorded, 0.0°C on many days during winter periods.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, CHEMICAL (HIGH LEVEL) (MG/L)	COLIFORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREPTOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARDNESS (MG/L AS CACO3)
OCT 18...	1000	E.01	1100	7.7	11.0	4.3	39	31	K1700	K110	560
NOV 29...	1000	13	638	8.0	2.0	10.8	79	23	180	K1700	400
DEC 17...	1300	4.0	1030	7.7	.5	14.0	97	25	760	K13	430
JAN 22...	1500	35	715	7.6	.0	13.8	99	29	142	197	350
FEB 26...	1400	10	847	7.8	.0	13.5	93	100	300	320	410
MAR 25...	1300	69	604	7.3	2.5	12.0	89	48	150	370	280
APR 08...	1400	154	850	7.7	9.0	10.4	92	--	162	148	390
MAY 22...	1430	100	910	8.1	20.0	11.3	124	32	110	110	430
JUN 16...	1330	--	940	8.1	15.0	10.3	101	--	340	150	470
JUL 18...	0900	2.2	734	7.6	20.5	4.3	48	22	--	55	360
AUG 19...	1330	E1.5	790	8.2	22.0	10.1	1	25	500	290	340
SEP 16...	1400	15	805	8.2	17.5	9.1	97	51	670	380	330

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SILVER, TOTAL RECOVERABLE (UG/L AS AG)	SODIUM, DISSOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM ADSORPTION RATIO	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)
OCT 18...	240	150	44	0	41	14	.8	8.7	380	0	310
NOV 29...	200	110	31	0	28	19	.7	5.8	250	0	210
DEC 17...	210	120	32	--	36	20	.8	5.2	270	0	220
JAN 22...	170	100	24	0	19	11	.4	3.2	220	0	180
FEB 26...	150	120	26	0	30	14	.6	3.5	310	0	250
MAR 25...	110	79	19	--	13	9	.3	5.4	200	0	160
APR 08...	210	110	27	0	11	6	.2	3.4	210	0	170
MAY 22...	160	120	31	0	14	14	.3	3.1	330	0	270
JUN 16...	230	130	35	--	15	6	.3	3.5	290	0	240
JUL 18...	160	91	31	--	21	11	.5	3.5	230	0	190
AUG 19...	130	85	30	0	21	12	.5	4.6	250	0	210
SEP 16...	120	81	31	0	27	13	.6	7.8	260	0	210

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	SOLIDS, RESIDUE AT 105 DEG. C, SUS-PENDED (MG/L)	SOLIDS, RESIDUE AT 105 DEG. C, TOTAL (MG/L)
OCT										
18...	12	200	80	.2	8.6	795	720	E.02	48	878
NOV										
29...	4.0	140	59	.2	4.3	527	503	18.5	5	574
DEC										
17...	8.6	180	85	.2	3.5	--	610	--	0	736
JAN										
22...	8.8	110	52	.2	5.9	485	445	45.8	44	503
FEB										
26...	7.9	120	57	.3	4.9	544	520	14.7	4	587
MAR										
25...	16	80	36	.3	5.3	387	257	72.1	24	420
APR										
08...	6.7	92	63	.2	3.9	622	485	259	--	--
MAY										
22...	3.4	110	66	.2	3.6	645	542	174	14	723
JUN										
16...	3.7	120	66	.3	.8	531	567	--	--	--
JUL										
18...	9.8	120	51	.3	3.9	601	442	3.57	6	606
AUG										
19...	2.6	110	49	.3	.8	502	427	E2.03	4	567
SEP										
16...	2.6	89	61	.1	4.5	515	456	21.4	8	586

DATE	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)
OCT										
18...	.01	.02	.080	.020	.10	.69	.77	.78	3.5	.190
NOV										
29...	.59	.40	.020	.000	.02	.69	.71	1.3	5.8	.110
DEC										
17...	3.7	3.4	.040	.000	.05	.64	.68	4.4	19	.050
JAN										
22...	5.8	5.0	.140	.030	.17	1.6	1.7	7.5	33	.090
FEB										
26...	1.3	1.3	.120	.130	--	.61	.73	2.0	9.0	.100
MAR										
25...	5.7	4.4	--	.550	--	--	--	--	--	.160
APR										
08...	18	16	.070	.020	.08	.82	.89	19	84	.090
MAY										
22...	15	14	.030	.050	.04	1.3	1.3	16	72	.110
JUN										
16...	11	12	.060	.010	.07	.68	.74	12	52	.070
JUL										
18...	.10	.09	.070	.040	.08	.71	.78	.88	3.9	.170
AUG										
19...	.02	.02	.050	.010	.06	.49	.54	.56	2.5	.120
SEP										
16...	2.9	2.6	.010	.000	.01	.60	.61	3.5	16	.190

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS PO4)	CHLOR-A PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CHLOR-B PHYTO-PLANK-TON CHROMO FLUOROM (UG/L)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT										
18...	.58	.100	.040	.12	--	.000	.0	--	--	--
NOV										
29...	.34	.090	.000	.00	2.83	.000	5.2	5	.18	100
DEC										
17...	.15	.140	.120	.37	3.45	.000	4.5	7	.17	100
JAN										
22...	.28	.070	.040	.12	.750	.000	--	6	.57	100
FEB										
26...	.31	.080	.040	.12	.540	.000	6.2	90	2.4	100
MAR										
25...	.49	.130	.040	.25	1.93	.000	--	13	2.4	100
APR										
08...	.28	.060	--	--	3.12	.000	--	16	6.7	100
MAY										
22...	.34	.040	.020	.06	8.65	2.56	9.1	63	17	100
JUN										
16...	.21	.050	--	--	2.46	.000	9.0	18	--	100
JUL										
18...	.52	.180	.150	.46	11.0	.000	11	6	.04	100
AUG										
19...	.37	.100	.090	.28	1.11	.000	8.3	4	<.02	100
SEP										
16...	.58	.170	.120	.37	2.99	.560	--	8	.32	100

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)	COBALT, DIS-SOLVED (UG/L AS CO)
OCT											
18...	1000	5	4	--	100	--	3	20	<10	--	3
DEC											
17...	1300	--	--	--	--	0	--	20	--	--	--
JAN											
22...	1500	4	2	100	50	--	4	20	10	1	0
FEB											
26...	1400	--	--	--	--	0	--	20	--	--	--
MAR											
25...	1300	--	--	--	--	--	--	--	--	--	--
APR											
08...	1400	1	1	<50	<50	--	2	30	10	1	0
MAY											
22...	1430	--	--	--	--	0	--	10	--	--	--
JUL											
18...	0900	--	--	--	--	0	--	20	--	--	--
AUG											
19...	1330	--	--	--	--	0	--	10	--	--	--
SEP											
16...	1400	3	3	100	100	0	0	30	<10	0	0

DATE	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM TOTAL RECOV-ERABLE (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)	MERCURY DIS-SOLVED (UG/L AS HG)
OCT											
18...	3	2	1200	70	5	0	--	230	140	.1	<.1
DEC											
17...	0	--	120	--	--	--	--	10	--	--	--
JAN											
22...	--	4	470	10	15	4	--	20	10	<.1	.1
FEB											
26...	10	--	430	--	--	--	--	30	--	--	--
MAR											
25...	--	--	--	--	--	--	--	--	--	--	--
APR											
08...	5	4	600	20	0	0	--	30	10	.2	.2
MAY											
22...	0	--	560	--	--	--	--	40	--	--	--
JUL											
18...	0	--	200	--	--	--	--	80	--	--	--
AUG											
19...	2	--	100	--	--	--	--	20	--	--	--
SEP											
16...	11	3	250	10	0	2	10	30	20	.4	.4

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)	PHENOLS (UG/L)
OCT 18...	0	0	0	0	0	--	4	8.6	.4	--	--
DEC 17...	0	--	--	--	--	60	--	--	--	--	--
JAN 22...	3	2	1	1	0	70	70	5.8	.2	--	--
FEB 26...	0	--	--	--	--	90	--	--	--	--	--
MAR 25...	0	--	--	--	--	--	--	--	--	--	--
APR 08...	2	2	3	0	0	60	20	14	.2	--	--
MAY 22...	0	--	--	--	--	180	--	--	--	--	--
JUL 18...	0	--	--	--	--	10	--	--	--	--	--
AUG 19...	2	--	--	--	--	20	--	--	--	--	--
SEP 16...	3	2	--	10	0	140	10	--	.4	.00	3

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV 29...	1000	42	134	.470	.630	1.19	.200
FEB 26...	1400	35	143	.000	.080	.560	.000
JUL 18...	0900	32	3230	5.59	7.56	.610	.570
AUG 19...	1330	33	130	1.89	2.60	5.46	1.27

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 13,78 1700	MAR 21,79 1430	MAY 31,79 1030	JUN 26,79 1330	JUL 24,79 1400	AUG 23,79 0900
TOTAL CELLS/ML	11000	450	360	800	560	440
DIVERSITY: DIVISION	0.7	1.4	0.7	2.0	2.0	1.3
.CLASS	0.7	1.4	0.7	2.0	2.0	1.3
..ORDER	0.9	1.4	1.5	2.7	2.1	1.3
...FAMILY	1.0	2.6	1.7	3.0	2.3	1.5
....GENUS	1.1	2.6	1.7	3.0	2.3	1.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...OOCYSTACEAE												
....ANKISTRODESMUS	--	-	5	1	--	-	39	5	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	310	3	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
....SELENASTRUM	720	7	--	-	--	-	--	-	--	-	--	-
....WESTELLA	--	-	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE												
....SCENEDESMUS	--	-	--	-	--	-	130#	16	26	5	26	6
..TETRASPORALES												
...PALMELLACEAE												
....GLOEOCYSTIS	410	4	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	100	1	--	-	--	-	190#	24	--	-	13	3
...PHACOTACEAE												
....PTEROMONAS	100	1	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	--	-	5	1	170#	46	90	11	52	9	13	3
....MELOSIRA	--	-	--	-	--	-	--	-	--	-	--	-
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-	13	3
....COCCONEIS	--	-	5	1	--	-	--	-	13	2	13	3
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE												
....AMPHORA	--	-	5	1	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	10	2	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	5	1	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	--	-	--	-	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE												
....NAVICULA	100	1	100#	22	13	4	52	6	--	-	13	3
...NITZSCHIACEAE												
....NITZSCHIA	100	1	30	7	120#	32	13	2	13	2	--	-
...SURIRELLACEAE												
....SURIRELLA	--	-	5	1	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	--	-	--	-	--	-	13	2	26	5	13	3
...CRYPTOMONADACEAE												
....CRYPTOMONAS	--	-	--	-	65#	18	120	15	130#	23	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	91#	20	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....OSCILLATORIA	--	-	150#	34	--	-	--	-	260#	47	320#	74
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-	--	-

04159810 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 13,78 1700		MAR 21,79 1430		MAY 31,79 1030		JUN 26,79 1330		JUL 24,79 1400		AUG 23,79 0900	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	9000#	83	--	-	--	-	26	3	--	-	--	-
....TRACHELOMONAS	--	-	35	8	--	-	13	2	13	2	13	3
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	120	15	--	-	--	-
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	--	-	26	5	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 25,80	MAY 22,80	JUN 16,80	JUL 18,80	AUG 19,80	SEP 16,80
TIME	1300	1430	1330	0900	1330	1400
TOTAL CELLS/ML	4000	480	690	260	190	4200
DIVERSITY: DIVISION	1.1	1.6	1.8	1.8	1.9	0.9
.CLASS	1.2	1.6	1.8	1.8	1.9	0.9
..ORDER	2.0	2.3	2.4	1.8	2.3	1.6
...FAMILY	2.2	2.8	2.9	2.1	3.2	1.7
....GENUS	2.2	3.1	2.9	2.1	3.2	2.1

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)												
.CHLOROPHYCEAE												
..CHLOROCOCCALES												
...OOCYSTACEAE												
....ANKISTRODESMUS	160	4	13	3	--	-	--	-	--	-	--	-
....CHLORELLA	*	0	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	13	2	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	26	10	--	-	*	0
....WESTELLA	--	-	--	-	52	8	--	-	--	-	--	-
...SCENEDESMACEAE												
....SCENEDESMUS	72	2	--	-	--	-	52#	20	26	13	64	2
..TETRASPORALES												
...PALMELLACEAE												
....GLOEOCYSTIS	--	-	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES												
...CHLAMYDOMONADACEAE												
....CHLAMYDOMONAS	130	3	39	8	120#	17	--	-	13	7	39	1
...PHACOTACEAE												
....PTEROMONAS	--	-	--	-	--	-	--	-	--	-	*	0
CHRYSOPHYTA												
.BACILLARIOPHYCEAE												
..CENTRALES												
...COSCINODISCACEAE												
....CYCLOTELLA	54	1	13	3	52	8	13	5	13	7	390	9
....MELOSIRA	--	-	100#	22	--	-	--	-	--	-	*	0
..PENNALES												
...ACHNANTHACEAE												
....ACHNANTHES	90	2	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	26	4	--	-	13	7	77	2
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-	26	1
...CYMBELLACEAE												
....AMPHORA	--	-	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE												
....DIATOMA	--	-	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE												
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	--	-	13	2	--	-	--	-	--	-
...GOMPHONEMATACEAE												
....GOMPHONEMA	--	-	--	-	--	-	--	-	26	13	*	0
...NAVICULACEAE												
....NAVICULA	130	3	52	11	65	9	--	-	13	7	26	1
...NITZSCHIACEAE												
....NITZSCHIA	230	6	120#	24	100#	15	--	-	13	7	39	1
...SURIRELLACEAE												
....SURIRELLA	--	-	26	5	--	-	--	-	--	-	--	-
.CHRYSOPHYCEAE												
..CHRYSOMONADALES												
...OCHROMONADACEAE												
....OCHROMONAS	130	3	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)												
.CRYPTOPHYCEAE												
..CRYPTOMONADALES												
...CRYPTOCHRYSIDACEAE												
....CHROOMONAS	*	0	--	-	--	-	--	-	26	13	--	-
...CRYPTOMONADACEAE												
....CRYPTOMONAS	*	0	26	5	52	8	13	5	26	13	26	1
CYANOPHYTA (BLUE-GREEN ALGAE)												
.CYANOPHYCEAE												
..CHROOCOCCALES												
...CHROOCOCCACEAE												
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-	2500#	58
....ANACYSTIS	--	-	26	5	190#	28	130#	50	26	13	450	11
....COCCOCHLORIS	650#	16	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES												
...NOSTOCACEAE												
....ANABAENA	--	-	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE												
....OSCILLATORIA	2300#	57	--	-	--	-	--	-	--	-	--	-
....PHORMIDIUM	--	-	--	-	--	-	--	-	--	-	540	13

04159810 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	MAR 25,80		MAY 22,80		JUN 16,80		JUL 18,80		AUG 19,80		SEP 16,80	
TIME	1300		1430		1330		0900		1330		1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
EUGLENOPHYTA (EUGLENOIDS)												
.EUGLENOPHYCEAE												
..EUGLENALES												
...EUGLENACEAE												
....EUGLENA	--	-	52	11	--	-	--	-	--	-	*	0
....TRACHELOMONAS	--	-	13	3	--	-	--	-	--	-	*	0
PYRRHOPHYTA (FIRE ALGAE)												
.DINOPHYCEAE												
..GYMNODINIALES												
...GYMNODINIACEAE												
....GYMNODINIUM	--	-	--	-	--	-	--	-	--	-	--	-
..PERIDINIALES												
...GLENODINIACEAE												
....GLENODINIUM	--	-	--	-	--	-	26	10	--	-	*	0

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04159010 PIGEON RIVER NEAR CASEVILLE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1540	---	---				---	---	853	909	724	575
2	1530	---	---				---	940	---	---	816	---
3	---	---	---				---	921	888	867	---	575
4	---	---	---				---	916	894	898	811	---
5	---	---	---				---	921	871	---	816	586
6	990	---	---				---	975	---	---	---	---
7	1200	---	---				---	1000	862	836	816	770
8	1000	---	---				---	---	866	821	816	794
9	---	---	---				---	980	883	704	---	805
10	---	---	---				---	985	---	724	---	---
11	1100	---	---				---	910	899	---	---	---
12	---	1380	---				---	950	899	---	---	794
13	1200	---	---				---	931	922	714	---	794
14	---	---	927				---	---	908	---	---	816
15	1210	---	978				902	842	899	806	714	816
16	1210	---	937				784	---	908	796	719	812
17	---	---	1020				764	822	---	---	724	---
18	1130	---	---				812	950	877	724	704	918
19	1140	---	1020				861	950	724	---	---	---
20	2000	---	1030				822	921	---	---	690	918
21	1980	---	1030				871	921	857	724	---	996
22	1360	---	1030				871	926	---	714	621	---
23	1030	---	1020				---	---	---	---	---	918
24	937	---	876				866	---	---	622	702	990
25	---	---	---				861	931	---	632	---	1020
26	932	---	824				876	---	816	632	---	1020
27	---	---	814				861	926	719	622	954	---
28	834	---	---				891	---	908	622	690	996
29	---	---	---				980	907	663	510	702	---
30	---	---	---				960	907	765	612	667	1040
31	---	---	---				---	857	---	816	---	---

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	17.5	---	---	---			---	---	16.5	20.0	---	24.0
2	15.0	---	---	---			---	18.0	---	---	---	---
3	---	---	---	---			---	18.0	15.0	---	22.0	22.0
4	---	---	---	---			---	20.0	20.0	25.0	24.0	23.0
5	---	---	---	---			---	21.0	20.0	23.0	22.0	---
6	11.0	---	---	---			---	19.0	16.0	21.0	25.0	---
7	10.0	---	---	---			---	14.0	15.5	20.0	24.0	22.5
8	10.0	---	---	---			---	---	16.0	21.0	---	23.0
9	---	---	---	---			---	13.0	15.0	---	23.0	---
10	---	---	---	---			---	15.0	17.0	---	---	17.0
11	8.0	---	---	---			---	17.0	15.0	---	---	---
12	---	5.0	---	---			---	16.0	21.0	---	---	17.0
13	8.0	---	---	---			---	13.0	21.0	---	20.0	16.0
14	---	---	.0	2.0			---	---	20.0	---	---	13.0
15	12.5	---	.0	3.0			8.0	16.0	17.5	25.0	23.5	20.0
16	13.0	5.0	.0	---			9.0	---	17.0	25.0	21.0	23.0
17	13.0	---	.0	.0			9.0	15.0	17.0	---	19.0	20.0
18	13.5	---	---	.0			12.0	15.5	19.0	25.0	23.5	16.0
19	15.5	---	.5	.5			15.0	15.0	15.0	---	---	---
20	17.0	---	.5	.0			19.0	16.0	---	---	25.0	10.0
21	21.0	---	1.0	---			15.0	19.0	19.5	24.0	---	11.0
22	21.5	---	1.0	.0			---	21.0	27.0	---	25.5	---
23	12.5	---	1.0	.0			14.5	---	---	---	---	---
24	8.0	---	1.0	.0			14.5	---	---	25.0	24.0	8.0
25	---	---	---	.0			14.5	17.0	---	23.0	19.0	9.0
26	6.0	---	1.5	---			12.0	18.0	25.0	22.0	24.0	---
27	---	---	.5	---			11.5	17.5	---	22.5	---	---
28	7.0	---	---	---			12.0	---	24.0	23.0	20.0	12.0
29	---	2.0	---	.0			12.0	22.0	17.0	20.0	21.0	11.0
30	---	---	---	.0			13.0	21.0	22.0	21.0	20.0	15.0
31	---	---	---	---			---	18.0	---	21.5	---	---

04159130 ST. CLAIR RIVER AT PORT HURON, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°59'19", long 82°25'29", in SE¼ sec.3, T.6 N., R.17 E., St. Clair County, Hydrologic Unit 04090001, at Port Huron municipal water treatment plant at Pine Grove Park at Port Huron.

DRAINAGE AREA.--222,400 mi^2 (576,000 km^2), approximately.

PERIOD OF RECORD.--Water years 1970-73, January 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to current year.
WATER TEMPERATURES: April 1978 to current year.

REMARKS.--Daily specific conductance and water-temperature records are once-daily measurements made by a local observer, between 0700 and 1600 hours. Samples are collected from a stilling well located in the Port Huron municipal water treatment plant. Depth-integrated samples for November, April, and July were collected by boat along river cross section in the vicinity of the water treatment plant. Biological Data (Phytoplankton) is for the 1979-80 water years.

COOPERATION.--Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 230 micromhos Dec. 11, 1980; minimum daily, 194 micromhos Jan. 27, 28, 1980.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16, 1980; minimum daily, 0.0°C Jan. 3-6, 1979.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 230 micromhos Dec. 11: minimum daily, 194 micromhos, Jan. 27, 28.
WATER TEMPERATURES: Maximum daily, 24.0°C Aug. 14-16; minimum daily, 1.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
17...	1130	211000	192	8.1	12.0	9.9	94	1	1	96	18	27
NOV												
20...	1330	212000	203	8.0	9.0	10.2	89	<1	K2	92	.11	25
DEC												
20...	1015	214000	201	7.3	3.0	11.7	87	K1	K2	92	15	26
JAN												
24...	1000	208000	205	7.5	1.0	13.5	98	<1	<1	96	18	27
FEB												
28...	1000	207000	215	7.4	.0	14.2	99	K1	<1	96	14	27
MAR												
27...	1000	190000	215	7.6	1.0	14.0	99	1	10	97	15	27
APR												
24...	1130	211000	204	7.7	5.0	10.8	85	<1	1	99	18	28
JUN												
05...	1030	209000	215	7.7	12.0	11.2	105	--	--	97	24	27
26...	1000	211000	203	7.9	15.0	9.8	98	<1	<1	96	23	27
JUL												
24...	1115	215000	210	8.2	21.0	8.7	101	K2	<1	96	15	27
AUG												
21...	0915	203000	210	8.0	21.0	8.8	100	K13	K4	97	19	27
SEP												
18...	0915	--	202	7.9	17.0	9.0	94	<1	K11	100	25	28

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
17...	7.0	0	3.3	.1	10	.8	96	0	79	1.2	16
NOV											
20...	7.1	0	3.1	.1	7	.8	98	0	80	1.6	15
DEC											
20...	6.6	--	3.2	.1	10	.9	94	0	77	7.5	16
JAN											
24...	7.0	0	3.5	.2	10	.9	96	0	79	4.9	17
FEB											
28...	6.9	0	3.6	.2	7	.8	100	0	82	6.4	16
MAR											
27...	7.1	--	3.2	.1	7	.8	100	0	82	4.0	15
APR											
24...	7.0	0	3.1	.1	6	.7	98	0	80	3.1	16
JUN											
05...	7.1	0	3.6	.2	7	.7	98	0	80	2.8	15
26...	7.0	--	3.5	.2	7	.8	100	0	82	1.8	14
JUL											
24...	7.0	0	3.3	.1	7	.9	100	0	81	1.0	16
AUG											
21...	7.1	0	4.4	.2	9	.8	100	0	78	1.5	16
SEP											
18...	7.5	--	3.3	.1	7	.8	110	0	76	1.9	16

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 17...	5.5	.1	1.0	102	109	58100	.26	.25	.000	.000	.00
NOV 20...	5.5	.1	1.0	116	107	66400	.28	.23	.010	.000	.01
DEC 20...	5.8	.1	1.3	109	107	63000	.25	.25	.040	.040	.05
JAN 24...	5.8	.1	1.3	116	111	65100	.31	.22	.020	.020	.03
FEB 28...	5.9	.1	1.3	128	112	71500	.22	.22	--	.040	--
MAR 27...	5.6	.1	1.1	106	108	54400	.33	.33	.040	.040	.05
APR 24...	5.8	.1	1.3	114	112	64900	.35	.31	--	.070	.02
JUN 05...	6.0	.1	.8	123	105	69400	.29	.29	.020	.020	.01
26...	6.1	.1	1.0	127	105	72400	.30	.30	.020	.020	.03
JUL 24...	6.0	.2	.4	111	111	64400	.32	.32	.040	.010	.05
AUG 21...	6.4	.2	.1	121	110	66300	.31	.31	--	--	.00
SEP 18...	6.5	.1	1.2	124	110	--	.25	.22	.030	.030	.04

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 17...	.66	.66	.92	4.1	.010	.03	.000	--	2	1140	100
NOV 20...	.24	.25	.53	2.3	.000	.00	.000	8.3	--	--	--
DEC 20...	.26	.30	.55	2.4	.010	.03	.010	3.4	--	--	--
JAN 24...	.26	.28	.59	2.6	.010	.03	.000	--	--	--	--
FEB 28...	--	--	--	--	.170	.52	.000	2.5	--	--	--
MAR 27...	.05	.09	.42	1.9	.010	.03	.000	2.1	--	--	--
APR 24...	--	.34	.69	3.1	.030	.09	.000	--	15	8550	100
JUN 05...	.19	.21	.50	2.2	.020	.06	.000	1.9	--	--	--
26...	.25	.27	.57	2.5	.010	.03	.000	3.9	--	--	--
JUL 24...	.05	.09	.41	1.8	.010	.03	.010	--	2	1160	100
AUG 21...	--	.18	.49	2.2	.050	.15	.010	.7	--	--	--
SEP 18...	.12	.15	.40	1.8	.000	.00	.000	2.2	--	--	--

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)
OCT										
17...	1130	1	1	--	30	--	0	20	20	--
JAN										
24...	1000	3	1	100	20	0	0	30	20	0
APR										
24...	1130	3	3	<50	40	1	0	10	10	0
JUL										
24...	1115	1	1	<50	20	2	2	10	10	0

DATE	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
OCT										
17...	0	--	2	50	10	--	0	0	0	.9
JAN										
24...	0	3	1	230	0	3	0	10	2	.1
APR										
24...	0	2	0	390	10	2	0	20	3	.1
JUL										
24...	0	6	3	60	0	1	0	10	0	.1

DATE	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
OCT										
17...	.2	--	1	0	0	0	10	7	8.4	.2
JAN										
24...	<.1	3	0	0	0	0	80	20	2.3	.4
APR										
24...	.1	0	0	0	0	0	20	20	2.0	.2
JUL										
24...	.1	3	0	0	0	0	10	9	6.4	1.4

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
NOV							
20...	1330	34	--	.000	.000	.000	.000
JUN							
05...	1030	42	806	.945	1.34	.490	.110
AUG							
21...	0915	28	258	1.65	1.89	.930	.020

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 8,78	MAR 12,79	MAY 25,79	JUN 21,79	JUL 19,79
[illegible]	1500	1500	1030	1100	1130
TOTAL CELLS/ML	5500	600	3000	1300	640
DIVERSITY: DIVISION	0.6	1.3	1.0	0.1	1.3
.CLASS	0.6	1.3	1.0	0.1	1.3
..ORDER	0.6	2.0	1.2	0.3	1.6
...FAMILY	0.7	2.3	2.2	0.9	1.6
....GENUS	1.1	2.3	2.3	0.9	1.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	*	0	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	72	1	--	-	--	-	--	-	39	6
....SELENASTRUM	--	-	--	-	130	4	--	-	13	2
...SCENEDESMACEAE										
....SCENEDESMUS	58	1	14	2	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	29	1	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	29	5	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	43	1	--	-	--	-	52	4	39	6
....MELOSIRA	--	-	14	2	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	90	3	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	*	0	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	160#	26	--	-	--	-	--	-
....FRAGILARIA	370	7	--	-	1300#	45	--	-	260#	40
....SYNEDRA	--	-	--	-	39	1	26	2	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	39	1	26	2	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	340	11	65	5	--	-
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	57	10	440	15	1100#	86	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	580	11	200#	33	520#	17	--	-	300#	46
....GOMPHOSPHAERIA	4300#	79	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	130#	21	--	-	--	-	--	-

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 8,78 1500		MAR 12,79 1500		MAY 25,79 1030		JUN 21,79 1100		JUL 19,79 1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	13	1	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	*	0	--	-	--	-

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 16,79	SEP 14,79	NOV 20,79	MAR 27,80	JUN 5,80
TIME	1100	1045	1330	1000	1030
TOTAL CELLS/ML	1500	4700	17000	2000	750
DIVERSITY: DIVISION	1.4	1.4	0.1	1.5	0.5
.CLASS	1.4	1.4	0.1	1.5	0.5
..ORDER	2.1	1.6	0.2	1.8	0.5
...FAMILY	2.2	2.1	0.2	2.4	1.8
....GENUS	2.2	2.3	0.2	2.9	2.2

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	56	3	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	*	0	--	-	21	1	43	6
....CHODATELLA	--	-	--	-	--	-	*	0	--	-
....KIRCHNERIELLA	13	1	--	-	--	-	*	0	--	-
....OOCYSTIS	13	1	--	-	120	1	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....SCENEDESMUS	280*	18	620	13	*	0	130	6	29	4
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	*	0	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	*	0	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	*	0	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	39	3	69	1	*	0	130	7	--	-
....MELOSIRA	--	-	--	-	--	-	92	4	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	91	2	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	*	0	--	-	--	-	--	-
....COCCONEIS	--	-	*	0	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	*	0	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	69	1	*	0	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	14	1	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	*	0	110	6	86	12
....FRAGILARIA	230*	15	1400*	29	*	0	150	7	260*	35
....SYNEDRA	--	-	*	0	*	0	270	13	--	-
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	*	0	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	150	3	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	13	1	69	1	*	0	120	6	100	13
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	*	0	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	46	1	--	-	56	3	230*	31
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	13	1	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	180	4	--	-	--	-	--	-
....ANACYSTIS	610*	39	1900*	42	17000*	98	850*	41	--	-
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...OSCILLATORIACEAE										
....OSCILLATORIA	320*	21	--	-	--	-	--	-	--	-

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 16,79		SEP 14,79		NOV 20,79		MAR 27,80		JUN 5,80	
TIME	1100		1045		1330		1000		1030	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)										
.DINOPHYCEAE										
..PERIDINIALES										
...GLENODINIACEAE										
....GLENODINIUM	--	-	--	-	--	-	21	1	--	-

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980 IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 26,80	JUL 24,80	AUG 21,80	SEP 18,80
TIME	1000	1115	0915	0915
TOTAL CELLS/ML	310	300	810	3400
DIVERSITY: DIVISION	1.4	1.3	1.4	1.4
.CLASS	1.4	1.3	1.4	1.4
..ORDER	2.1	1.5	1.5	1.5
...FAMILY	2.1	1.6	1.5	1.9
....GENUS	2.4	1.6	1.5	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	--	-	--	-	100	13	330	10
....SELENASTRUM	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....SCENEDESMUS	39	13	52#	17	--	-	210	6
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	*	0
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	13	4	13	4	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	64#	21	13	4	140#	17	39	1
....MELOSIRA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	13	2	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	77#	25	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	350	10
....SYNEDRA	39	13	--	-	--	-	--	-
...GOMPHONEMATACEAE								
....GOMPHONEMA	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	13	4	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	--	-	13	4	--	-	51	1
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	--	-	--	-	--	-	390	11
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	--	-	--	-	13	2	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	410	12
....ANACYSTIS	77#	25	190#	65	530#	65	1600#	48
....GOMPHOSPHAERIA	--	-	--	-	--	-	--	-
..HORMOGONALES								
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	--	-

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 26,80		JUL 24,80		AUG 21,80		SEP 18,80	
TIME	1000		1115		0915		0915	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....TRACHELOMONAS	--	-	--	-	--	-	--	-
PYRRHOPHYTA (FIRE ALGAE)								
.DINOPHYCEAE								
..PERIDINIALES								
...GLENODINIACEAE								
....GLENODINIUM	--	-	--	-	13	2	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04159130 ST. CLAIR RIVER AT PORT HURON, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	210	208	201	205	---	221	215	207	---	208	208	208
2	210	207	203	206	205	223	212	---	207	209	204	208
3	212	---	202	207	202	220	211	206	207	209	204	208
4	212	---	202	---	197	217	209	206	207	209	206	208
5	211	---	203	209	195	212	210	206	207	209	207	208
6	211	---	203	214	200	216	211	212	207	209	209	206
7	211	---	202	209	199	217	206	207	208	209	209	206
8	211	---	203	209	201	210	207	213	208	209	209	206
9	210	---	202	210	207	210	207	---	---	209	212	208
10	212	204	204	207	203	210	207	211	208	209	212	208
11	211	204	230	208	207	210	207	205	208	210	212	208
12	208	204	204	205	204	212	205	205	208	210	209	208
13	208	---	204	203	205	213	204	205	208	210	209	208
14	210	---	203	207	198	213	205	206	211	211	209	208
15	210	---	205	204	204	227	205	207	211	211	209	207
16	207	206	206	205	206	216	212	---	211	209	209	207
17	207	206	204	205	204	210	208	208	209	208	208	207
18	206	205	213	205	202	210	205	208	209	209	209	---
19	206	205	204	205	199	209	203	206	209	209	209	212
20	207	205	203	204	202	205	203	206	211	209	208	210
21	207	203	204	203	201	206	203	208	209	209	208	210
22	207	205	205	203	204	217	203	207	208	208	209	209
23	206	205	205	203	208	221	203	207	208	208	211	206
24	206	205	205	203	207	216	205	207	209	208	210	209
25	207	204	205	196	206	221	216	207	209	209	210	209
26	208	204	205	200	210	219	205	209	209	209	208	209
27	208	200	206	194	215	216	205	207	209	209	208	209
28	205	201	202	194	215	213	210	207	209	208	208	210
29	208	---	205	---	217	216	206	207	209	207	208	210
30	207	---	203	204	---	218	206	207	208	206	208	208
31	207	---	203	204	---	211	---	---	---	207	208	---
MEAN	209		205			215	207			209	209	

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18.0	11.0	6.0	3.0	1.0	1.0	2.0	5.0	---	16.0	22.0	22.5
2	18.0	11.0	7.0	4.5	1.0	1.0	2.0	5.5	12.0	16.0	20.5	22.5
3	18.0	11.0	5.0	4.0	1.0	1.0	2.0	5.0	12.0	17.0	20.5	22.5
4	17.5	11.5	6.0	---	1.0	1.0	3.0	5.5	13.0	16.0	20.5	22.5
5	17.5	11.5	6.0	1.0	1.0	1.0	4.0	5.5	13.0	16.0	20.5	22.5
6	16.0	11.0	7.0	1.0	1.0	1.0	4.0	9.0	14.0	17.0	21.0	20.0
7	15.5	11.0	5.0	1.0	1.0	1.0	4.0	9.0	14.0	17.0	21.0	21.0
8	14.5	10.5	5.0	1.0	1.0	1.5	5.0	9.0	13.0	17.0	21.0	21.0
9	14.5	10.0	5.0	1.0	1.0	1.5	5.0	9.0	13.0	17.0	21.0	21.0
10	14.5	9.0	5.0	1.0	1.0	1.5	5.0	9.0	12.0	17.0	21.0	21.0
11	14.5	8.0	5.0	2.0	1.0	1.0	5.0	9.0	13.0	17.0	21.0	21.0
12	14.5	7.5	5.0	2.0	1.0	1.0	3.0	9.0	13.0	18.0	21.0	21.0
13	13.5	7.5	5.0	2.0	1.0	1.0	3.0	8.5	14.0	18.0	22.0	21.0
14	12.5	8.0	5.0	2.0	1.0	1.0	3.0	8.5	13.0	18.0	24.0	21.0
15	13.0	7.5	5.5	1.5	1.0	1.0	3.0	9.0	13.0	18.0	24.0	21.0
16	15.0	7.5	5.5	1.5	1.0	1.0	3.0	---	13.0	18.0	24.0	19.5
17	15.0	7.5	5.5	1.5	1.0	1.0	3.0	9.5	13.0	18.0	23.0	19.5
18	14.0	7.5	4.0	1.5	1.0	1.0	3.0	9.5	13.0	18.0	22.0	19.5
19	14.0	8.0	4.5	2.0	1.0	1.0	4.0	9.5	13.0	22.0	22.0	19.5
20	14.0	8.5	4.5	2.0	1.0	1.0	5.0	9.5	13.0	22.0	22.0	19.5
21	14.0	9.0	4.5	2.0	1.0	1.0	5.0	9.5	14.0	22.0	22.0	20.0
22	14.0	9.0	5.0	1.5	1.0	1.0	5.0	9.5	14.5	22.0	22.0	20.0
23	14.5	9.0	5.0	1.5	1.0	1.0	5.0	11.0	15.0	22.0	22.0	20.0
24	14.0	9.0	5.0	1.0	1.0	1.0	5.0	11.0	15.0	22.0	22.0	20.0
25	13.0	9.5	5.0	1.5	1.0	1.0	5.0	11.0	15.0	22.0	22.0	20.0
26	12.0	9.0	5.0	1.0	1.0	1.0	5.0	13.0	15.0	22.0	22.0	20.0
27	11.5	9.5	5.0	1.0	1.0	1.0	5.0	13.0	15.0	22.0	22.0	18.0
28	11.0	9.5	5.0	1.0	1.0	1.0	5.0	13.0	16.0	22.0	22.0	18.0
29	10.5	7.0	5.0	1.0	1.0	2.0	5.0	13.0	16.0	22.0	22.0	18.0
30	10.5	7.0	4.0	1.0	---	2.0	5.0	13.0	16.0	22.0	22.0	18.0
31	11.0	---	4.5	2.0	---	2.0	---	---	---	22.0	23.0	---
MEAN	14.0	9.0	5.0		1.0	1.0	4.0				22.0	20.5

04159488 SILVER CREEK NEAR JEDDO, MI

LOCATION.--Lat 43°08'40", long 82°39'07", in SE¼ NW¼ sec.12, T.8 N., R.15 E., St. Clair County, Hydrologic Unit 04090001, on left bank 10 ft (3 m) downstream of bridge on Comstock Road, 3.5 mi (5.6 km) west of Jeddo.

DRAINAGE AREA.--20.6 mi² (53.4 km²).

PERIOD OF RECORD.--January 1978 to current year.

GAGE.--Water-stage recorder. Datum of gage is 707.43 ft (215.625 m) National Geodetic Vertical Datum of 1929 (levels by local surveying firm).

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 549 ft³/s (15.5 m³/s) Apr. 4, 1980, gage height, 8.03 ft (2.448 m); maximum gage height, 9.71 ft (2.960 m) Mar. 4, 1979, backwater from ice; minimum discharge, 0.14 ft³/s (0.004 m³/s) June 19, 20, 21, 25, 26, Aug. 17, 18, 1978; minimum gage height, 3.62 ft (1.103 m) Aug. 17, 18, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	unknown	430	12.2	unknown		Apr. 14	2200	304	8.61	6.90	2.103
Apr. 4	0500	*549	15.5	*8.03	4.448						

Minimum discharge, 0.38 ft³/s (0.011 m³/s) Sept. 11, gage height, 3.63 ft (1.106 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.5	1.4	5.0	6.8	6.0	10	46	19	8.1	5.3	11	1.7
2	1.7	1.4	4.5	6.5	6.0	9.0	26	12	8.4	5.3	6.8	4.9
3	1.8	1.3	4.5	6.5	6.0	8.0	41	8.5	8.9	4.6	9.7	7.0
4	1.9	1.3	4.5	6.5	6.0	8.0	417	6.7	8.4	4.9	7.8	7.3
5	2.1	1.3	6.0	6.5	6.0	7.5	54	7.2	8.4	5.1	8.8	3.6
6	2.3	1.4	7.0	7.0	6.0	7.5	24	7.5	8.8	5.1	15	.85
7	2.0	1.5	8.0	9.0	6.0	7.0	16	7.2	9.9	5.1	10	.63
8	2.0	1.5	8.8	9.0	6.0	7.0	15	7.1	10	5.1	6.7	.52
9	2.0	1.5	9.7	9.0	6.0	8.0	28	7.0	8.8	4.4	6.5	.63
10	2.0	1.8	6.8	9.0	6.0	8.5	39	6.7	9.1	3.1	4.4	.50
11	1.9	1.8	4.9	12	6.0	9.5	24	6.0	8.2	3.4	4.3	.42
12	1.9	1.8	4.0	26	6.0	11	24	5.1	8.2	3.8	5.0	.56
13	1.8	2.0	4.4	46	6.0	12	21	8.6	4.4	3.4	4.3	2.1
14	1.8	2.0	4.0	33	6.0	11	113	25	2.1	3.8	4.8	3.7
15	1.8	2.0	3.5	22	6.0	11	170	14	2.1	3.8	6.7	2.6
16	1.7	1.8	3.5	17	5.5	12	64	9.4	4.4	5.3	6.4	2.0
17	1.5	2.0	3.0	11	5.5	350	22	9.3	1.2	7.3	5.1	12
18	1.5	2.0	3.0	12	5.5	118	16	127	.92	5.8	3.7	22
19	1.6	2.2	3.0	11	5.0	37	13	42	1.5	4.0	3.3	7.7
20	1.6	2.3	3.0	9.7	5.0	29	12	19	3.1	3.4	3.3	3.1
21	1.7	3.4	3.0	8.0	5.5	170	10	12	2.3	2.9	2.7	1.8
22	1.8	4.6	3.5	6.5	7.0	75	12	9.6	3.8	9.1	2.6	9.2
23	2.0	6.2	6.8	6.5	9.0	47	11	8.5	4.0	20	1.2	112
24	1.9	7.3	42	6.5	8.0	57	6.2	8.3	4.6	10	.89	25
25	1.8	5.0	154	6.5	7.0	67	5.8	8.2	4.9	6.8	.88	7.2
26	1.7	10	67	6.5	10	44	5.7	8.1	6.0	5.6	1.0	3.6
27	1.6	7.7	20	6.5	15	59	5.7	8.3	6.0	50	1.9	2.8
28	1.5	8.3	12	6.0	12	47	7.9	8.6	7.1	112	.78	2.0
29	1.5	10	10	6.0	11	27	18	8.6	6.5	42	1.2	1.7
30	1.4	6.0	8.8	6.0	---	20	34	8.6	5.1	24	1.7	1.5
31	1.4	---	7.6	6.0	---	41	---	8.5	---	19	1.3	---
TOTAL	54.7	102.8	435.8	346.5	201.0	1335.0	1301.3	451.6	175.22	393.4	149.75	250.61
MEAN	1.76	3.43	14.1	11.2	6.93	43.1	43.4	14.6	5.84	12.7	4.83	8.35
MAX	2.3	10	154	46	15	350	417	127	10	112	15	112
MIN	1.4	1.3	3.0	6.0	5.0	7.0	5.7	5.1	.92	2.9	.78	.42
CFSM	.09	.17	.68	.54	.34	2.09	2.11	.71	.28	.62	.23	.41
IN.	.10	.19	.79	.63	.36	2.41	2.35	.82	.32	.71	.27	.45

CAL YR 1979 TOTAL 4068.64 MEAN 11.1 MAX 368 MIN .66 CFSM .54 IN 7.35
WTR YR 1980 TOTAL 5197.68 MEAN 14.2 MAX 417 MIN .42 CFSM .69 IN 9.39

04159500 BLACK RIVER NEAR FARGO, MI

LOCATION.--Lat 43°05'32", long 82°37'05", in NW¼ sec.32, T.8 N., R.16 E., St. Clair County, Hydrologic Unit 04090001, on left bank 20 ft (6 m) downstream from bridge on Norman Road, 2.1 mi (3.4 km) east of Fargo, 5.3 mi (8.5 km) upstream from Mill Creek, and 12 mi (19 km) northwest of Port Huron.

DRAINAGE AREA.--480 mi^2 (1,243 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--February 1944 to current year.

REVISED RECORDS.--WSP 1307: 1950(M). WSP 1627: 1956-58. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 613.75 ft (187.071 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to July 9, 1954, nonrecording gage at same site and datum.

REMARKS.--Water-discharge records good except those for the winter period, which are fair.

AVERAGE DISCHARGE.--36 years, 275 ft^3/s (7.788 m^3/s), 7.78 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 14,400 ft^3/s (408 m^3/s) Apr. 5, 1947, gage height, 16.06 ft (4.895 m), from floodmark, from rating curve extended above 9,500 ft^3/s (269 m^3/s); maximum gage height observed, 18.05 ft (5.502 m) Feb. 20, 1951, backwater from ice; minimum discharge observed, 1.8 ft^3/s (0.051 m^3/s) Sept. 18, 19, 1946.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft^3/s (99.1 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Mar. 17	2300	ice jam		*11.27	3.435	Apr. 4	2000	3690		9.94	3.030
Mar. 18	0600	*4620		11.02	3.359						

Minimum discharge, 13 ft^3/s (0.37 m^3/s) Oct. 18, 31; minimum gage height, 1.78 ft (0.543 m) Oct. 18.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	16	18	146	250	43	55	1130	385	76	78	345	42
2	22	18	108	206	40	50	992	313	81	63	315	50
3	23	18	91	172	37	47	659	250	87	55	212	52
4	22	17	89	135	35	44	2710	201	87	47	156	52
5	23	18	74	115	35	42	3010	169	83	44	121	47
6	22	19	76	110	35	41	1980	147	84	43	244	40
7	20	19	161	106	35	40	965	130	84	38	247	35
8	22	18	212	103	35	40	611	117	98	43	207	32
9	25	18	188	95	35	40	603	107	105	36	155	30
10	23	20	151	95	35	40	841	100	112	35	124	29
11	23	21	124	100	35	60	837	94	109	33	111	28
12	21	22	106	180	35	80	635	88	99	35	137	26
13	22	23	110	300	35	70	669	93	88	35	142	32
14	22	22	110	298	35	60	816	139	74	35	161	39
15	24	21	95	203	35	60	2630	173	69	33	124	42
16	21	21	91	152	35	65	2560	156	64	34	98	56
17	16	20	98	137	35	1200	1570	134	61	38	77	80
18	15	20	90	173	35	4310	764	434	54	35	58	182
19	16	20	85	232	35	3440	513	584	56	38	55	345
20	16	20	65	218	35	1830	402	463	62	42	49	260
21	16	19	57	179	35	1410	332	323	64	34	47	171
22	24	24	57	133	50	1450	285	235	63	44	45	126
23	26	31	66	110	80	1120	247	184	60	114	41	333
24	21	70	245	100	150	866	210	149	57	92	38	823
25	20	148	1940	85	220	940	185	126	52	79	36	589
26	20	162	3000	75	100	770	165	111	48	60	33	332
27	19	253	2270	65	700	842	151	97	46	198	31	215
28	19	258	1020	60	65	983	156	89	55	1100	30	150
29	17	196	488	55	60	834	224	82	115	1020	29	112
30	15	187	360	50	---	603	374	84	89	704	29	91
31	15	---	305	46	---	541	---	80	---	479	33	---
TOTAL	626	1741	12078	4338	2175	21973	27226	5837	2282	4764	3530	4441
MEAN	20.2	58.0	390	140	75.0	709	908	188	76.1	154	114	148
MAX	26	258	3000	300	700	4310	3010	584	115	1100	345	823
MIN	15	17	57	46	35	40	151	80	46	33	29	26
CFSM	.04	.12	.81	.29	.16	1.48	1.89	.39	.16	.32	.24	.31
IN.	.05	.13	.94	.34	.17	1.70	2.11	.45	.18	.37	.27	.34

CAL YR 1979 TOTAL 83313 MEAN 228 MAX 3700 MIN 15 CFSM .48 IN 6.46
WTR YR 1980 TOTAL 91011 MEAN 249 MAX 4310 MIN 15 CFSM .52 IN 7.05

04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

WATER-QUALITY

PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: August 1978 to current year.

INSTRUMENTATION.--Temperature recorder since Aug. 4, 1978.

REMARKS.--Missing record was due to vandalism.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURES: Maximum (water years 1979-80), 28.0°C Aug. 14, 1978, July 14, 15, 1980; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURES: Maximum recorded, 28.0°C July 14, 15; minimum, 0.0°C on many days during winter period.

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	OCTOBER		NOVEMBER		DECEMBER		JANUARY		FEBRUARY		MARCH	
1	20.0	18.0	9.5	9.0	2.5	1.0	.5	.5	.0	.0	.5	.5
2	19.5	19.0	8.5	7.0	1.0	.5	.5	.5	.0	.0	.5	.5
3	19.5	18.5	7.0	6.0	.5	.5	.5	.0	.0	.0	.5	.5
4	18.5	17.0	7.0	5.0	.5	.5	.0	.0	.0	.0	.5	.5
5	17.0	16.0	6.0	5.0	.5	.5	.0	.0	.0	.0	.5	.5
6	16.0	14.5	6.0	5.5	1.0	.5	.0	.0	.0	.0	.5	.5
7	15.0	13.5	6.0	5.0	1.0	1.0	.0	.0	.0	.0	.5	.5
8	13.5	12.5	5.0	4.5	1.0	.5	.0	.0	.0	.0	.5	.5
9	13.5	12.5	4.0	3.5	.5	.5	.0	.0	.0	.0	.5	.5
10	12.5	11.5	4.0	3.5	.5	.5	.0	.0	.0	.0	1.0	.5
11	11.0	9.5	4.0	3.5	2.5	.5	.0	.0	.0	.0	1.0	1.0
12	11.5	10.5	3.5	2.5	2.5	2.5	.0	.0	.0	.0	1.0	1.0
13	10.5	9.5	3.0	2.5	2.5	1.0	.0	.0	.0	.0	1.0	1.0
14	10.0	8.5	3.0	3.0	1.0	1.0	.0	.0	.0	.0	1.0	1.0
15	11.0	9.5	3.5	2.5	1.0	.5	.0	.0	.0	.0	1.0	1.0
16	11.0	9.0	4.0	2.5	.5	.5	.0	.0	.0	.0	1.0	1.0
17	11.5	11.0	4.5	3.0	.5	.5	.0	.0	.0	.0	1.0	1.0
18	12.5	11.0	5.5	4.0	.5	.5	.0	.0	.0	.0	1.5	1.0
19	13.5	12.0	6.5	5.0	.5	.5	.0	.0	.0	.0	2.0	1.5
20	14.5	13.0	6.5	5.0	.5	.5	.0	.0	.0	.0	3.0	2.0
21	16.5	14.0	6.5	6.0	.5	.5	.0	.0	.5	.5	3.0	2.5
22	17.5	15.5	8.0	6.5	.5	.5	.0	.0	.5	.5	2.5	2.0
23	17.0	13.0	8.0	8.0	.5	.5	.0	.0	.5	.5	2.0	1.5
24	12.5	10.0	8.0	7.0	.5	.5	.0	.0	.5	.5	2.0	2.0
25	10.0	8.5	7.0	6.0	2.5	.5	.0	.0	.5	.5	2.0	2.0
26	8.5	7.0	6.5	5.5	2.5	2.0	.0	.0	.5	.5	2.5	2.0
27	7.0	6.5	6.0	5.0	2.0	1.5	.0	.0	.5	.5	4.0	2.5
28	7.0	7.0	5.0	4.5	1.5	1.0	.0	.0	.5	.5	4.0	4.0
29	7.5	6.0	4.5	3.0	1.0	1.0	.0	.0	.5	.5	5.0	4.0
30	8.0	5.5	3.0	2.5	1.0	.5	.0	.0	---	---	5.0	4.5
31	9.0	6.5	---	---	.5	.5	.0	.0	---	---	5.5	5.5
MONTH	20.0	5.5	9.5	2.5	2.5	.5	.5	.0	.5	.0	5.5	.5

04159500 BLACK RIVER NEAR FARGO, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN
	APRIL		MAY		JUNE		JULY		AUGUST		SEPTEMBER	
1	5.5	5.0	13.0	11.5	20.5	17.0	22.0	20.0	24.0	21.5	23.0	22.0
2	5.5	5.0	15.0	12.5	19.0	17.0	23.0	21.0	24.0	22.0	22.0	21.0
3	5.5	5.5	16.5	14.0	19.0	17.5	24.0	21.0	23.5	22.0	22.0	19.5
4	5.5	4.5	18.0	15.0	19.5	17.0	24.0	22.0	24.5	22.0	22.0	20.0
5	4.5	3.5	19.0	17.5	19.0	17.0	23.0	21.5	24.5	23.0	23.0	20.5
6	6.5	4.5	19.0	16.5	20.5	17.5	24.0	21.0	24.5	22.5	22.5	20.0
7	7.5	6.5	19.0	16.0	20.5	18.5	23.5	21.0	24.0	23.0	21.5	19.0
8	8.5	7.5	16.0	13.5	19.0	17.5	25.0	22.0	24.5	23.0	22.0	18.5
9	8.5	8.5	14.0	12.5	18.0	16.0	24.0	22.0	25.0	23.0	21.0	18.5
10	8.5	7.5	14.0	12.0	16.5	15.0	26.0	20.0	24.5	22.5	21.0	17.0
11	7.5	6.5	16.0	13.5	18.0	14.5	26.0	23.0	23.0	21.5	20.0	16.5
12	6.5	6.5	16.5	14.5	19.5	16.0	25.5	23.0	22.5	21.0	19.0	18.0
13	6.5	5.5	16.5	15.0	21.0	18.0	24.5	21.0	21.5	20.5	18.5	17.5
14	6.5	5.0	15.5	13.0	20.5	19.0	28.0	22.0	22.5	20.5	17.5	17.0
15	5.0	4.5	13.5	12.0	19.0	17.0	28.0	25.0	22.5	21.0	18.0	16.0
16	5.0	4.0	15.5	12.5	18.0	15.0	27.0	23.5	21.5	19.5	17.5	16.5
17	5.5	4.5	15.5	14.0	19.0	16.0	26.0	24.0	21.5	20.0	16.5	15.0
18	8.0	6.0	14.5	13.5	19.5	18.0	26.0	22.0	22.0	19.5	15.0	13.5
19	10.5	8.0	16.0	14.0	19.0	18.0	27.0	23.5	22.0	20.5	---	---
20	12.5	10.5	16.5	14.5	20.5	17.0	26.5	25.0	23.5	21.5	---	---
21	13.5	11.0	17.5	15.5	21.0	18.5	27.0	24.5	24.0	22.5	---	---
22	14.5	12.5	19.5	16.5	22.5	20.0	26.5	24.5	24.0	21.5	---	---
23	14.5	13.0	21.0	18.5	25.0	21.5	24.5	22.0	24.0	20.5	---	---
24	13.5	11.5	20.5	19.0	25.5	23.0	24.5	21.0	24.5	20.5	---	---
25	12.5	10.5	20.5	18.5	26.5	23.5	25.0	22.0	24.5	21.5	---	---
26	12.0	11.0	20.0	17.0	27.5	24.5	25.0	22.5	26.0	22.5	---	---
27	12.0	11.0	19.0	16.0	26.5	24.0	23.0	22.0	26.5	23.0	---	---
28	11.5	11.0	18.5	17.0	24.0	21.5	22.0	21.0	25.5	23.0	---	---
29	11.5	11.0	18.5	17.0	24.5	21.5	21.0	20.5	26.0	23.5	---	---
30	12.0	10.5	20.0	18.0	23.5	21.5	21.5	20.5	25.0	23.0	---	---
31	---	---	20.5	19.0	---	---	22.0	21.0	24.0	22.5	---	---
MONTH	14.5	3.5	21.0	11.5	27.5	14.5	28.0	20.0	26.5	19.5		

04160570 NORTH BRANCH BELLE RIVER AT IMLAY CITY, MI

LOCATION.--Lat 43°01'49", long 83°04'02", in SW¼ NW¼ sec.16, T.7 N., R.12 E., Lapeer County, Hydrologic Unit 04090001, on left bank 12 ft (4 m) upstream from bridge on State Highway 21, and 0.6 mi (1.0 km) northeast of Imlay City.

DRAINAGE AREA.--18.0 mi² (46.6 km²).

PERIOD OF RECORD.--August 1965 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 800 ft (244 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Some diversion by pumping for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 11.2 ft³/s (0.317 m³/s), 8.45 in/yr (215 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 334 ft³/s (9.46 m³/s) Apr. 19, 1975, gage height, 9.33 ft (2.844 m); no flow for part of each day June 27, 28, 1977, June 26-28, 1979, caused by irrigation pumpage.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 60 ft³/s (1.70 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1100	99	2.80	5.70	1.737	Apr. 14	2200	101	2.86	5.75	1.753
Mar. 17	2100	*138	3.91	*6.52	1.987	July 28	0200	107	3.03	6.02	1.835
Apr. 4	0600	129	3.65	6.33	1.929						

Minimum daily discharge, 0.64 ft³/s (0.018 m³/s) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.64	2.8	6.7	8.4	2.9	3.7	32	18	2.6	2.0	47	4.0
2	1.8	3.4	5.9	7.5	2.8	3.3	24	14	2.8	1.3	26	4.4
3	2.0	3.0	5.9	6.7	2.7	3.1	26	11	5.4	.80	24	3.6
4	1.8	2.6	4.7	5.9	2.6	2.9	117	9.6	4.4	.89	15	2.6
5	1.6	2.5	5.2	5.2	2.5	2.8	64	8.4	3.6	1.6	14	2.3
6	1.6	2.6	7.5	5.0	2.5	2.8	43	6.9	8.1	1.3	37	1.9
7	1.8	3.4	7.5	4.5	2.4	2.8	34	6.2	14	.98	19	1.9
8	1.9	3.2	7.2	4.3	2.4	2.8	31	5.7	21	23	14	1.6
9	2.6	3.4	5.9	4.1	2.3	3.0	46	5.4	15	12	13	3.4
10	2.3	4.9	5.2	4.0	2.3	3.5	38	5.2	13	7.8	9.6	3.4
11	2.3	4.2	5.4	11	2.2	5.8	29	4.9	9.9	5.2	9.0	2.5
12	2.6	3.4	7.2	15	2.2	4.5	27	4.7	7.2	4.9	9.9	2.3
13	2.5	3.0	6.9	11	2.2	4.3	22	9.0	5.7	6.4	7.2	11
14	2.3	3.0	5.4	8.1	2.2	4.3	49	15	6.7	3.6	5.4	15
15	2.2	3.2	4.4	6.2	2.2	4.3	74	9.9	8.1	3.6	4.7	8.4
16	1.8	3.6	4.4	6.2	2.2	6.0	50	8.1	6.4	6.4	3.8	6.2
17	1.8	3.4	4.2	7.2	2.2	91	33	8.1	5.2	5.2	2.8	36
18	1.9	3.2	4.0	8.4	2.2	79	25	29	4.0	3.4	2.6	30
19	2.0	3.0	3.8	7.2	2.2	42	19	19	6.9	3.6	2.0	17
20	2.6	3.0	3.6	6.7	2.3	31	15	12	15	2.5	2.0	11
21	2.6	3.6	2.8	6.5	2.7	42	13	9.9	9.6	2.3	5.9	8.4
22	2.5	5.7	5.7	5.4	3.5	40	11	7.5	7.5	6.9	9.0	14
23	2.8	10	8.7	6.2	9.0	26	10	5.9	5.4	6.4	5.7	48
24	2.6	17	26	4.4	7.5	30	9.0	5.2	4.2	4.0	3.8	24
25	2.3	13	87	4.0	6.0	35	8.4	4.7	3.2	2.3	2.8	16
26	2.2	22	66	3.8	5.0	28	7.8	3.8	2.5	2.2	2.5	11
27	2.2	15	37	3.6	4.5	35	7.5	3.4	2.3	36	2.2	7.8
28	2.3	13	23	3.5	4.3	32	12	2.8	3.2	92	1.8	5.7
29	2.3	10	17	3.3	4.0	24	17	2.6	3.6	60	1.6	3.8
30	2.0	8.1	12	3.2	---	20	23	2.5	2.5	35	6.4	3.2
31	2.0	---	9.6	3.0	---	30	---	2.6	---	45	4.4	---
TOTAL	65.84	182.2	405.8	189.5	94.0	644.9	916.7	261.0	209.0	388.57	314.1	310.4
MEAN	2.12	6.07	13.1	6.11	3.24	20.8	30.6	8.42	6.97	12.5	10.1	10.3
MAX	2.8	22	87	15	9.0	91	117	29	21	92	47	48
MIN	.64	2.5	2.8	3.0	2.2	2.8	7.5	2.5	2.3	.80	1.6	1.6
CFSM	.12	.34	.73	.34	.18	1.16	1.70	.47	.39	.69	.56	.57
IN.	.14	.38	.84	.39	.19	1.33	1.89	.54	.43	.80	.65	.64

CAL YR 1979 TOTAL 2920.43 MEAN 8.00 MAX 113 MIN .39 CFSM .44 IN 6.04
WTR YR 1980 TOTAL 3982.01 MEAN 10.9 MAX 117 MIN .64 CFSM .61 IN 8.23

04160600 BELLE RIVER AT MEMPHIS, MI

LOCATION.--Lat 42°54'03", long 82°46'09", in NW¼ SE¼ sec.35, T.6 N., R.14 E., St. Clair County, Hydrologic Unit 04090001, on right bank, at downstream side of bridge on State Highway 19 at Memphis.

DRAINAGE AREA.--151 mi^2 (391 km^2).

PERIOD OF RECORD.--October 1962 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 720 ft (219 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--18 years, 83.8 ft^3/s (2.373 m^3/s), 7.54 in/yr (192 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,520 ft^3/s (128 m^3/s) Apr. 19, 1975, gage height, 8.96 ft (2.731 m); minimum, 2.3 ft^3/s (0.065 m^3/s) Sept. 6, 10, 1978; minimum gage height, 1.17 ft (0.357 m) Sept. 6, 1978.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 1947, reached a stage of about 9 ft (2.7 m), from information by local residents.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 600 ft^3/s (17.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 26	1100	686	19.4	4.89	1.490	Apr. 4	2100	*1250	35.4	*6.49	1.978
Mar. 18	1500	1030	29.2	5.94	1.811	Apr. 15	2000	743	21.0	5.08	1.548

Minimum discharge, 3.7 ft^3/s (0.10 m^3/s) Oct. 1, gage height, 1.31 ft (0.399 m) Oct. 1.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.5	11	41	77	17	22	304	178	18	13	149	15
2	6.0	11	38	64	16	22	281	124	18	12	147	15
3	5.3	11	37	57	15	20	240	93	19	12	97	16
4	7.7	15	34	54	14	18	1020	68	22	12	83	16
5	11	14	31	50	14	17	1020	59	23	11	64	14
6	10	14	43	47	14	18	656	53	24	9.8	60	12
7	9.4	14	54	45	14	16	369	46	29	11	52	11
8	9.9	14	53	43	14	17	249	40	46	19	45	10
9	10	15	47	41	13	19	270	37	71	32	36	11
10	11	16	40	40	13	18	349	35	56	37	32	10
11	12	17	34	43	13	28	307	34	45	25	31	13
12	12	18	34	55	13	26	244	33	31	21	31	13
13	12	17	33	66	13	28	221	37	25	17	27	14
14	12	15	33	64	13	28	338	54	23	17	25	20
15	14	14	32	59	13	30	648	75	23	15	23	30
16	9.2	14	32	49	13	70	631	64	23	14	21	24
17	23	14	27	49	13	584	422	56	23	14	19	27
18	12	15	26	58	13	856	262	220	22	14	17	47
19	10	14	26	58	13	702	181	264	22	14	17	56
20	14	14	23	54	13	345	136	172	23	13	16	40
21	14	13	23	45	14	403	113	93	29	11	29	30
22	14	15	23	45	20	396	94	68	26	14	26	25
23	11	22	31	44	39	328	81	51	23	14	24	26
24	10	36	133	41	63	311	69	42	20	18	20	54
25	10	48	503	35	49	452	59	34	17	15	17	49
26	12	54	645	30	40	357	55	29	16	14	14	36
27	11	79	477	25	31	337	50	25	14	16	13	29
28	11	71	269	23	28	344	57	22	14	44	13	24
29	11	62	164	21	26	305	96	21	15	131	13	21
30	10	52	118	20	---	235	172	21	14	125	13	19
31	10	---	95	18	---	224	---	19	---	87	12	---
TOTAL	339.0	739	3199	1420	584	6576	8994	2167	774	821.8	1186	727
MEAN	10.9	24.6	103	45.8	20.1	212	300	69.9	25.8	26.5	38.3	24.2
MAX	23	79	645	77	63	856	1020	264	71	131	149	56
MIN	4.5	11	23	18	13	16	50	19	14	9.8	12	10
CFSM	.07	.16	.68	.30	.13	1.40	1.99	.46	.17	.18	.25	.16
IN.	.08	.18	.79	.35	.14	1.62	2.22	.53	.19	.20	.29	.18

CAL YR 1979 TOTAL 22618.1 MEAN 62.0 MAX 892 MIN 3.2 CFSM .41 IN 5.57
WTR YR 1980 TOTAL 27526.8 MEAN 75.2 MAX 1020 MIN 4.5 CFSM .50 IN 6.78

04160800 SASHABAW CREEK NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°43'12", long 83°21'13", in SE¼ sec.26, T.4 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on right bank 25 ft (8 m) upstream from bridge on Maybee Road, 1.1 mi (1.8 km) upstream from mouth, and 2.5 mi (4.0 km) northeast of Drayton Plains.

DRAINAGE AREA.--20.9 mi² (54.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Metal V-notch weir Aug. 30, 1961, to Mar. 6, 1968. Altitude of gage is 970 ft (296 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 12.0 ft³/s (0.340 m³/s), 7.80 in/yr (198 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 161 ft³/s (4.56 m³/s) Feb. 23, 1974, gage height, 4.38 ft (1.335 m); minimum, 0.2 ft³/s (0.006 m³/s) on many days during 1961, 1963, 1964, 1965, 1966; minimum gage height, 1.59 ft (0.485 m) Aug. 1, 2, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 45 ft³/s (1.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	unknown	67	1.90	unknown	
Apr. 4	1000	*80	2.27	*3.68	1.122
Apr. 15	0400	67	1.90	3.51	1.070

Minimum discharge, 0.41 ft³/s (0.012 m³/s) Oct. 1, gage height, 1.88 ft (0.573 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.45	1.7	15	15	4.0	5.0	30	32	9.9	5.5	6.7	9.5
2	1.4	2.2	13	14	4.0	4.5	30	30	9.5	5.1	8.9	10
3	1.5	2.2	13	13	4.0	4.5	30	28	13	4.7	21	10
4	1.1	2.0	9.9	12	4.0	4.5	69	26	13	4.5	15	9.1
5	1.2	1.8	9.9	11	4.0	4.5	56	25	11	5.1	13	8.8
6	1.5	2.0	11	10	4.0	4.5	46	23	11	5.3	24	8.5
7	1.5	2.3	12	9.5	4.0	4.5	41	22	12	5.0	19	8.3
8	1.3	2.3	11	9.0	4.0	4.5	39	21	15	8.6	16	8.0
9	1.7	3.0	10	8.5	4.0	5.0	47	21	13	9.0	14	8.7
10	1.6	5.3	10	8.5	4.0	5.0	45	21	12	7.5	14	9.2
11	1.9	4.4	10	9.0	4.0	5.0	41	21	9.7	6.7	14	8.2
12	2.5	4.2	11	10	4.0	5.0	39	21	8.7	6.4	15	8.0
13	2.8	4.0	11	11	4.0	5.0	36	22	7.8	6.2	14	9.5
14	2.5	3.7	11	10	4.0	5.0	41	23	7.6	5.7	12	12
15	2.2	4.2	10	9.5	4.0	5.0	62	20	8.0	5.3	11	10
16	1.9	4.8	9.6	9.5	4.0	8.0	51	18	7.7	5.4	9.9	9.5
17	1.8	5.0	10	10	4.0	60	44	18	7.0	5.3	9.3	19
18	1.9	4.9	8.7	10	4.0	40	39	34	6.6	4.9	9.3	19
19	2.5	4.7	8.7	9.5	4.0	31	34	29	6.9	4.7	8.7	15
20	2.7	4.8	8.2	9.0	4.0	29	33	25	8.5	4.4	9.2	13
21	2.5	4.9	8.0	8.5	4.0	34	30	22	7.0	4.1	20	12
22	2.3	7.4	10	8.0	6.0	31	29	19	6.4	6.1	19	12
23	3.7	12	12	7.5	7.0	28	28	18	5.9	6.2	14	17
24	3.5	19	16	6.5	7.0	27	27	18	5.5	5.5	12	15
25	3.2	18	32	6.0	7.0	29	27	15	5.2	5.2	11	13
26	3.3	24	32	5.5	6.5	26	25	13	4.9	4.9	10	12
27	3.2	22	26	5.0	6.0	25	25	11	7.8	5.9	9.9	11
28	2.8	21	23	4.5	5.6	27	32	10	7.6	11	9.2	11
29	2.3	19	20	4.3	5.4	28	35	9.6	6.6	9.4	8.8	10
30	2.0	17	18	4.1	---	27	36	10	5.9	8.0	8.5	10
31	1.8	---	16	4.0	---	28	---	11	---	7.3	8.5	---
TOTAL	66.55	233.8	426.0	271.9	134.5	549.5	1147	636.6	260.7	188.9	394.9	336.3
MEAN	2.15	7.79	13.7	8.77	4.64	17.7	38.2	20.5	8.69	6.09	12.7	11.2
MAX	3.7	24	32	15	7.0	60	69	34	15	11	24	19
MIN	.45	1.7	8.0	4.0	4.0	4.5	25	9.6	4.9	4.1	6.7	8.0
CFSM	.10	.37	.66	.42	.22	.85	1.83	.98	.42	.29	.61	.54
IN.	.12	.42	.76	.48	.24	.98	2.04	1.13	.46	.34	.70	.60

CAL YR 1979 TOTAL 3986.78 MEAN 10.9 MAX 80 MIN .45 CFSM .52 IN 7.10
WTR YR 1980 TOTAL 4646.65 MEAN 12.7 MAX 69 MIN .45 CFSM .61 IN 8.27

04160900 CLINTON RIVER NEAR DRAYTON PLAINS, MI

LOCATION.--Lat 42°39'37", long 83°23'25", in NE¼ sec.21, T.3 N., R.9 E., Oakland County, Hydrologic Unit 04090003, on left bank 14 ft (4 m) downstream from bridge on State Highway 59, 1.0 mi (1.6 km) downstream from State fish hatchery, and 2.0 mi (3.2 km) south of Drayton Plains.

DRAINAGE AREA.--79.2 mi² (205.1 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 940 ft (287 m) from topographic map (nearest 10 ft). Jan. 29 to July 9, 1964, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation and occasional diversion for lake level control at many lakes above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 50.1 ft³/s (1.419 m³/s), 8.59 in/yr (218 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 276 ft³/s (7.82 m³/s) Mar. 12, 1974, gage height, 4.95 ft (1.509 m); minimum, 2.4 ft³/s (0.068 m³/s) May 31, 1961; minimum gage height, 1.23 ft (0.375 m) Jan. 4, 1961.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 129 ft³/s (3.65 m³/s) Apr. 14, gage height, 3.66 ft (1.116 m); minimum, 9.1 ft³/s (0.26 m³/s) Oct. 4, 5, 6, gage height, 1.99 ft (0.607 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	9.5	35	58	69	39	33	79	66	34	17	17	34
2	11	35	59	67	38	31	73	52	35	17	26	35
3	9.5	35	60	65	37	30	88	37	41	17	58	34
4	9.5	34	60	62	35	30	96	42	40	17	69	33
5	9.1	34	60	60	34	30	98	44	48	19	71	33
6	9.4	33	59	58	33	30	102	44	76	30	88	33
7	9.5	32	59	57	32	30	110	44	81	19	106	32
8	9.9	31	57	55	32	31	113	47	77	20	101	32
9	14	32	56	53	31	31	113	47	72	18	96	42
10	31	31	56	52	31	31	112	45	68	17	86	57
11	35	30	54	54	31	30	111	42	51	17	81	49
12	49	29	54	56	31	30	110	40	24	17	83	22
13	46	27	52	52	31	30	111	42	39	17	67	17
14	43	26	50	51	30	29	123	45	77	17	55	28
15	41	27	49	51	31	29	123	43	56	16	31	41
16	42	26	48	50	31	35	123	43	20	16	21	23
17	42	25	50	49	32	47	122	46	20	15	15	48
18	36	25	45	49	31	45	120	54	18	15	14	64
19	29	25	44	48	30	50	116	77	21	16	14	61
20	29	25	43	48	30	55	114	114	17	15	16	60
21	29	27	43	48	30	65	110	104	17	15	41	60
22	30	30	43	47	36	68	107	89	16	32	69	66
23	33	37	43	51	33	77	105	86	16	37	58	66
24	35	40	49	45	33	83	103	72	16	35	61	63
25	34	40	57	44	33	83	98	66	16	32	59	61
26	34	46	56	43	36	83	94	71	16	13	51	58
27	34	46	57	43	32	82	84	67	18	15	50	55
28	33	53	66	41	32	81	76	62	17	16	44	45
29	32	55	73	41	33	82	66	62	17	40	32	45
30	32	56	70	40	---	81	66	30	18	58	32	46
31	33	---	69	40	---	83	---	32	---	36	33	---
TOTAL	873.9	1027	1699	1589	948	1555	3066	1755	1082	681	1645	1343
MEAN	28.2	34.2	54.8	51.3	32.7	50.2	102	56.6	36.1	22.0	53.1	44.8
MAX	49	56	73	69	39	83	123	114	81	58	106	66
MIN	9.1	25	43	40	30	29	66	30	16	13	14	17
CFSM	.36	.43	.69	.65	.41	.63	1.29	.72	.46	.28	.67	.57
IN.	.41	.48	.80	.75	.45	.73	1.44	.82	.51	.32	.77	.63

CAL YR 1979 TOTAL 14936.9 MEAN 40.9 MAX 122 MIN 8.6 CFSM .52 IN 7.02
WTR YR 1980 TOTAL 17263.9 MEAN 47.2 MAX 123 MIN 9.1 CFSM .60 IN 8.11

04161000 CLINTON RIVER AT AUBURN HEIGHTS, MI

LOCATION.--Lat 42°38'00", long 83°13'28", in NW¼ sec.36, T.3 N., R.10 E., Oakland County, Hydrologic Unit 04090003, on right bank 30 ft (9 m) upstream from bridge on Auburn Road at Auburn Heights, and 2.8 mi (4.5 km) upstream from Galloway Creek.

DRAINAGE AREA.--123 mi² (319 km²).

PERIOD OF RECORD.--May 1935 to June 1939 and February to September 1940 (published as "at Pontiac"), October 1956 to current year.

REVISED RECORDS.--WSP 1307: 1937(M). WSP 1507: Drainage area at former site.

GAGE.--Water-stage recorder. Datum of gage is 846.50 ft (258.013 m) National Geodetic Vertical Datum of 1929. Prior to October 1940, nonrecording gage at site 3.3 mi (5.3 km) upstream at datum 876.01 ft (267.008 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Some regulation by many lakes above station. Flow includes waste from city of Pontiac water supply, most of which is obtained from sources outside the basin. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--27 years (water years 1936-38, 1957-80), 102 ft³/s (2.889 m³/s), 11.26 in/yr (286 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,720 ft³/s (48.7 m³/s) Apr. 19, 1975, gage height, 5.37 ft (1.637 m); minimum observed, 4.8 ft³/s (0.14 m³/s) Sept. 4, 1936, site then in use.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 1,210 ft³/s (34.3 m³/s) Sept. 22, gage height, 4.51 ft (1.375 m); minimum, 44 ft³/s (1.25 m³/s) July 20, 21, gage height, 1.19 ft (0.363 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	55	114	101	118	112	80	166	174	129	61	58	134
2	135	95	97	123	105	73	180	172	112	63	118	140
3	54	92	101	127	104	79	314	170	166	65	174	149
4	62	89	108	115	107	90	337	165	105	63	95	115
5	80	89	167	118	105	165	234	130	72	89	185	80
6	105	93	135	117	105	74	210	75	176	66	175	75
7	79	95	147	126	99	82	207	71	136	73	148	66
8	81	94	134	129	96	80	276	68	79	135	160	63
9	82	127	117	131	90	83	261	79	87	73	146	111
10	78	123	122	126	84	116	243	87	133	67	170	66
11	91	100	108	206	90	86	234	89	156	66	201	67
12	100	93	131	155	91	76	245	94	154	72	188	69
13	109	88	115	138	89	78	222	162	100	60	163	139
14	100	88	109	111	88	96	431	125	166	61	159	109
15	107	105	108	113	89	90	313	102	174	61	157	110
16	111	98	109	119	87	171	264	93	158	84	150	125
17	113	90	99	164	79	353	252	174	117	67	156	273
18	111	82	101	120	83	121	245	234	119	63	93	168
19	119	88	104	112	89	112	242	126	154	50	69	167
20	115	89	105	104	85	134	226	114	103	45	85	118
21	107	106	110	107	60	249	225	121	64	50	103	114
22	113	151	176	114	120	148	224	145	57	62	76	287
23	121	180	127	93	105	127	226	146	59	50	66	227
24	91	177	240	94	79	143	225	147	62	52	63	224
25	87	119	282	101	79	181	225	136	64	52	74	175
26	90	203	141	106	76	164	214	129	67	63	89	180
27	88	120	120	106	84	160	233	134	118	62	89	162
28	85	150	116	111	85	174	241	136	65	82	109	105
29	87	109	128	110	82	214	226	122	58	59	107	96
30	92	105	124	113	---	188	199	127	61	56	136	94
31	94	---	121	112	---	187	---	154	---	56	145	---
TOTAL	2942	3352	4003	3739	2647	4164	7340	4001	3271	2028	3907	4008
MEAN	94.9	112	129	121	91.3	134	245	129	109	65.4	126	134
MAX	135	203	282	206	120	353	431	234	176	135	201	287
MIN	54	82	97	93	60	73	166	68	57	45	58	63

CAL YR 1979 TOTAL 41176 MEAN 113 MAX 474 MIN 33
WTR YR 1980 TOTAL 45402 MEAN 124 MAX 431 MIN 45

04161100 GALLOWAY CREEK NEAR AUBURN HEIGHTS, MI

LOCATION.--Lat 42°40'02", long 83°12'02", in SE¼ sec.18, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank 12 ft (4 m) downstream from wooden bridge on Oakland University property, and 2.7 mi (4.3 km) northeast of Auburn Heights.

DRAINAGE AREA.--17.9 mi² (46.4 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Concrete control since Aug. 20, 1960. Datum of gage is 820.78 ft (250.174 m) National Geodetic Vertical Datum of 1929 (levels by Johnson and Anderson, Inc.).

REMARKS.--Records good except those for period of no gage-height record, Jan. 9 to Mar. 19, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 9.85 ft³/s (0.279 m³/s), 7.47 in/yr (190 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 368 ft³/s (10.4 m³/s) June 25, 1968, gage height, 6.27 ft (1.911 m); minimum, 0.01 ft³/s (<0.001 m³/s) on several days during July and August, 1964; minimum gage height, 0.82 ft (0.250 m) Aug. 1, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 90 ft³/s (2.55 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 18	unknown	*105	2.97	*4.80	1.465
Apr. 4	0500	102	2.89	4.76	1.451
Apr. 14	1900	95	2.69	4.67	1.423

Minimum discharge, 1.3 ft³/s (0.037 m³/s) Oct. 1, gage height, 1.61 ft (0.491 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.4	3.1	13	13	2.3	3.0	29	22	5.2	3.8	4.5	6.6
2	15	2.9	11	12	2.1	2.8	26	19	5.4	3.3	11	6.2
3	4.2	2.4	9.2	10	2.1	2.8	27	16	13	3.1	28	5.1
4	4.9	2.2	8.6	8.8	2.1	2.8	86	14	8.6	2.9	15	4.5
5	5.4	2.0	11	8.0	2.1	2.8	66	12	6.7	4.9	18	3.9
6	5.6	2.0	12	6.6	2.1	2.8	45	10	14	3.9	20	3.5
7	4.9	2.3	12	6.7	2.1	2.8	34	9.2	22	3.3	12	3.2
8	3.5	2.0	12	5.7	2.1	2.8	33	8.2	19	12	8.2	2.9
9	3.5	2.9	9.6	6.0	2.1	2.8	54	7.5	15	6.4	6.2	4.0
10	2.9	5.2	9.0	7.0	2.1	4.5	51	6.9	11	5.4	7.6	3.6
11	2.9	3.5	8.4	9.0	2.1	5.5	38	7.3	8.4	4.5	12	3.5
12	3.8	3.1	9.8	10	2.1	4.5	34	6.9	6.7	4.8	31	3.3
13	3.2	2.8	8.6	13	2.1	4.0	28	11	5.6	4.2	20	9.4
14	2.8	2.6	7.6	11	2.1	5.0	55	13	5.9	3.9	12	8.6
15	2.6	2.9	6.7	9.0	2.1	6.0	77	11	6.9	3.5	8.2	7.5
16	2.3	3.5	6.2	9.5	2.1	25	60	10	6.6	3.9	5.9	5.9
17	2.2	3.1	5.4	10	2.1	80	42	14	5.2	3.5	4.9	24
18	2.0	2.8	5.4	13	2.1	100	32	51	4.3	3.3	5.2	14
19	2.0	2.7	5.2	11	2.2	57	25	36	5.7	3.1	4.2	10
20	2.0	2.6	4.9	10	2.4	41	21	25	6.6	2.8	4.9	7.8
21	2.2	3.1	4.6	9.0	5.0	57	18	18	4.9	2.7	12	6.6
22	2.0	9.0	8.8	8.0	9.0	45	17	14	4.3	3.3	15	12
23	3.8	21	11	7.0	12	36	15	11	3.6	3.3	12	34
24	2.9	34	39	6.0	9.0	38	13	10	3.2	3.1	8.6	23
25	2.7	23	72	5.0	7.0	40	13	8.4	2.9	2.8	6.6	15
26	2.4	48	58	4.5	6.0	32	12	6.6	2.9	2.9	5.2	11
27	2.2	29	39	4.0	4.5	27	11	5.6	12	12	4.5	8.6
28	2.2	32	27	3.5	3.2	25	24	4.9	6.2	12	3.9	7.6
29	2.0	23	21	3.0	3.1	29	25	4.6	4.9	9.0	3.5	6.9
30	1.9	17	17	2.8	---	27	26	4.6	4.3	6.6	3.2	6.4
31	1.9	---	15	2.5	---	30	---	6.6	---	5.2	4.2	---
TOTAL	103.3	295.7	488.0	244.6	101.4	743.9	1037	404.3	231.0	149.4	317.5	268.6
MEAN	3.33	9.86	15.7	7.89	3.50	24.0	34.6	13.0	7.70	4.82	10.2	8.95
MAX	15	48	72	13	12	100	86	51	22	12	31	34
MIN	1.4	2.0	4.6	2.5	2.1	2.8	11	4.6	2.9	2.7	3.2	2.9
CFSM	.19	.55	.88	.44	.20	1.34	1.93	.73	.43	.27	.57	.50
IN.	.21	.61	1.01	.51	.21	1.55	2.15	.84	.48	.31	.66	.56

CAL YR 1979 TOTAL 3962.1 MEAN 10.9 MAX 119 MIN 1.1 CFSM .61 IN 8.23
WTR YR 1980 TOTAL 4384.7 MEAN 12.0 MAX 100 MIN 1.4 CFSM .67 IN 9.11

04161540 PAINT CREEK AT ROCHESTER, MI

LOCATION.--Lat 42°41'18", long 83°08'35", in NW¼ SE¼ sec.10, T.3 N., R.11 E., Oakland County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Ludlow Street in Rochester, and 1.5 mi (2.4 km) upstream from mouth.

DRAINAGE AREA.--70.9 mi² (183.6 km²).

PERIOD OF RECORD.--October 1959 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 755.11 ft (230.158 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Lake Orion. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--21 years, 50.6 ft³/s (1.433 m³/s), 9.69 in/yr (246 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 918 ft³/s (26.0 m³/s) Feb. 1, 1968; maximum gage height, 5.95 ft (1.814 m) Feb. 10, 1965, backwater from ice; minimum discharge, 1.2 ft³/s (0.034 m³/s) Aug. 19, 1974, caused by regulation due to bridge construction; minimum gage height, 1.26 ft (0.384 m) Sept. 16, 1960.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	1600	470	13.3	*a3.99	1.216	July 27	1900	*534	15.1	3.93	1.198
Apr. 4	0600	305	8.64	3.30	1.006	Aug. 5	2000	225	6.37	2.96	0.902
Apr. 14	1900	275	7.79	3.20	0.975	Aug. 21	1600	344	9.74	3.38	1.030

a ice jam.

Minimum discharge, 12 ft³/s (0.34 m³/s) Oct. 1, gage height, 1.56 ft (0.475 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	23	65	61	23	30	99	86	41	26	50	43
2	37	23	61	59	22	29	90	82	39	24	64	43
3	19	21	59	56	21	28	106	80	43	22	111	38
4	22	20	53	53	21	27	251	78	40	20	74	33
5	24	20	54	51	21	26	164	75	37	24	83	31
6	26	20	57	47	21	26	143	68	40	23	116	28
7	21	22	54	43	21	26	139	64	66	21	77	27
8	19	22	52	38	21	26	144	59	66	93	60	26
9	23	26	48	38	21	26	162	56	51	55	52	35
10	31	31	45	40	21	27	154	53	45	43	49	35
11	35	28	43	50	21	28	132	53	38	37	58	30
12	34	29	46	52	21	28	130	49	36	35	76	28
13	32	29	43	52	21	28	118	65	32	33	49	46
14	29	29	40	53	21	28	191	72	34	30	45	54
15	28	33	38	51	21	28	198	62	37	28	40	44
16	28	37	37	50	21	30	145	57	37	30	34	38
17	28	35	34	56	21	320	126	70	33	28	33	92
18	28	35	31	55	21	148	121	149	31	25	34	68
19	28	34	30	51	21	87	113	108	35	23	30	52
20	30	34	30	49	24	104	103	96	41	21	34	45
21	31	37	30	48	27	161	97	91	36	21	136	42
22	32	54	35	47	37	134	90	86	33	32	114	57
23	35	87	44	46	40	116	78	70	31	29	68	80
24	33	100	95	43	39	125	67	62	30	26	48	59
25	24	75	156	37	35	125	65	56	30	23	39	48
26	20	119	92	33	33	103	62	53	29	23	34	44
27	19	94	71	31	32	101	61	45	39	82	30	40
28	19	97	63	29	32	96	84	42	33	122	29	37
29	19	81	62	27	31	96	90	40	30	84	28	35
30	19	70	60	25	---	90	93	40	29	70	31	34
31	19	---	61	24	---	101	---	43	---	59	34	---
TOTAL	807	1365	1689	1395	732	2348	3616	2110	1142	1212	1760	1312
MEAN	26.0	45.5	54.5	45.0	25.2	75.7	121	68.1	38.1	39.1	56.8	43.7
MAX	37	119	156	61	40	320	251	149	66	122	136	92
MIN	15	20	30	24	21	26	61	40	29	20	28	26
CFSM	.37	.64	.77	.64	.36	1.07	1.71	.96	.54	.55	.80	.62
IN.	.42	.72	.89	.73	.38	1.23	1.90	1.11	.60	.64	.92	.69

CAL YR 1979 TOTAL 15697 MEAN 43.0 MAX 350 MIN 12 CFSM .61 IN 8.24
WTR YR 1980 TOTAL 19488 MEAN 53.2 MAX 320 MIN 15 CFSM .75 IN 10.22

04161580 STONY CREEK NEAR ROMEO, MI

LOCATION.--Lat 42°48'03", long 83°05'25", in SW¼ sec.31, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank at upstream side of bridge on Romeo Road, and 4.0 mi (6.4 km) west of Romeo.

DRAINAGE AREA.--25.6 mi² (66.3 km²).

PERIOD OF RECORD.--October 1964 to current year.

GAGE.--Water-stage recorder. Datum of gage is 861.64 ft (262.628 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--16 years, 17.5 ft³/s (0.496 m³/s), 9.28 in/yr (236 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 290 ft³/s (8.21 m³/s) Apr. 19, 1975, gage height, 5.19 ft (1.582 m); minimum, 0.92 ft³/s (0.026 m³/s) Oct. 5, 9, 1967; minimum gage height, 1.28 ft (0.390 m) July 27, 28, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	1400	*151	4.28	*4.02	1.225
Apr. 5	0200	116	3.29	3.47	1.058
July 8	0500	112	3.17	3.40	1.036

Minimum discharge, 2.1 ft³/s (0.059 m³/s) Oct. 1; minimum gage height, 1.47 ft (0.448 m) Sept. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	9.2	19	24	7.0	8.5	43	27	7.1	4.3	17	5.8
2	4.6	11	17	23	7.0	8.0	40	24	7.1	4.0	19	6.1
3	5.7	9.2	16	21	7.0	7.5	48	21	17	3.9	28	6.6
4	8.8	8.7	16	18	7.0	7.5	108	18	15	4.0	18	5.4
5	8.9	7.6	17	17	7.0	7.5	111	16	12	4.5	18	4.8
6	9.0	7.6	19	15	7.0	7.5	92	15	12	4.5	20	4.5
7	8.9	9.5	18	14	7.0	7.5	76	13	16	4.0	15	3.9
8	6.7	7.7	17	13	7.0	8.0	72	12	21	59	17	3.7
9	6.7	8.0	15	12	7.0	8.5	84	11	37	36	14	5.8
10	5.2	12	14	12	7.0	8.5	79	11	39	24	9.6	5.6
11	4.7	10	14	14	7.0	8.5	72	12	30	16	9.5	4.5
12	7.9	8.2	16	16	7.0	8.5	68	11	19	12	13	4.2
13	10	8.7	16	16	7.0	8.5	60	20	8.8	11	9.1	7.7
14	8.8	12	13	15	7.0	8.5	69	35	7.4	7.7	8.2	9.3
15	6.8	16	12	14	7.0	8.5	91	31	7.3	8.4	10	6.3
16	5.6	17	12	14	7.0	12	90	28	7.1	8.7	8.0	5.5
17	5.1	16	9.8	15	7.0	100	74	30	6.3	7.2	8.8	17
18	5.6	16	11	16	7.0	89	65	63	5.9	5.7	8.5	11
19	6.5	15	12	17	7.0	65	56	58	6.4	5.1	5.3	7.5
20	9.2	14	11	16	7.0	53	51	49	8.8	4.8	4.8	9.7
21	11	14	11	15	7.0	54	44	35	7.0	6.9	5.3	8.3
22	9.7	17	15	14	10	58	36	24	5.9	7.1	6.0	8.3
23	13	21	24	12	12	46	27	21	5.3	6.6	4.8	15
24	15	24	35	11	12	44	20	32	5.0	6.4	4.3	11
25	14	21	63	10	12	42	20	25	4.8	5.5	4.1	9.3
26	11	27	58	9.0	11	37	18	15	4.6	5.2	3.9	9.2
27	10	23	52	8.5	10	38	17	10	4.6	12	3.8	8.0
28	9.9	22	45	8.0	9.5	38	26	8.1	4.6	22	3.7	7.3
29	8.2	21	39	7.5	9.0	41	30	7.3	4.5	25	3.9	7.2
30	7.8	20	30	7.0	---	38	30	7.2	4.3	21	4.1	16
31	7.9	---	27	7.0	---	42	---	7.7	---	20	4.3	---
TOTAL	254.4	433.4	693.8	431.0	232.5	918.5	1717	697.3	340.8	372.5	309.0	234.5
MEAN	8.21	14.4	22.4	13.9	8.02	29.6	57.2	22.5	11.4	12.0	9.97	7.82
MAX	15	27	63	24	12	100	111	63	39	59	28	17
MIN	2.2	7.6	9.8	7.0	7.0	7.5	17	7.2	4.3	3.9	3.7	3.7
CFSM	.32	.56	.88	.54	.31	1.16	2.23	.88	.45	.47	.39	.31
IN.	.37	.63	1.01	.63	.34	1.33	2.49	1.01	.50	.54	.45	.34

CAL YR 1979 TOTAL 5012.6 MEAN 13.7 MAX 88 MIN 2.2 CFSM .54 IN 7.28
WTR YR 1980 TOTAL 6634.7 MEAN 18.1 MAX 111 MIN 2.2 CFSM .71 IN 9.64

04161790 STONY LAKE NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'58", long 83°05'58", in SE¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 1,000 ft (305 m) east of bridge over dam on Stony Creek, and 2.7 mi (4.3 km) west of Washington.

DRAINAGE AREA.--68.0 mi^2 (176.1 km^2).

PERIOD OF RECORD.--February 1963 to current year.

REVISED RECORDS.--WDR MI-77-1: 1976.

GAGE.--Water-stage recorder. Datum of gage is 790.00 ft (240.792 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority). Gage readings have been converted to elevations NGVD.

REMARKS.--Reservoir is formed by an earthfill dam with concrete spillway completed in 1962. The spillway section includes a drum gate with minimum crest elevation of 796 ft (242.6 m), maximum of 802 ft (244.4 m); and 2 sluices, one on each side, with valve controls capable of draining lake. Total capacity (new capacity table put into use Oct. 1, 1973), 4,649 acre-ft (5.73 hm^3) at elevation of 802 ft (244.4 m). The reservoir began filling February 1963. Lake is used for recreational purposes.

EXTREMES FOR PERIOD OF RECORD.--Maximum contents, 5,495 acre-ft (6.78 hm^3) May 17, 18, 1974, Apr. 20, 1975, elevation 803.6 ft (244.94 m); minimum recorded, 1,758 acre-ft (2.17 hm^3) Nov. 21, 1967, elevation, 794.7 ft (242.22 m).

EXTREMES FOR CURRENT YEAR.--Maximum contents, 5,039 acre-ft (6.21 hm^3) May 19, elevation, 802.75 ft (244.68 m); minimum, 3,571 acre-ft (4.40 hm^3) Nov. 9, elevation, 799.75 ft (243.76 m).

MONTHEND ELEVATION AND CONTENTS AT 2400, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

Date	Elevation (feet)	Contents (acre-feet)	Change in contents during month	
			Acre-feet	Equivalent in ft^3/s
Sept. 30	802.0	4649	--	--
Oct. 31	800.0	3683	-966	-15.7
Nov. 30	800.2	3775	+92	+1.5
Dec. 31	800.0	3683	-92	-1.5
CAL YR 1979	--	--	+310	+0.4
Jan. 31	*799.8	3593	-90	-1.5
Feb. 29	799.8	3593	0	0
Mar. 31	801.8	4549	+956	+15.5
Apr. 30	801.8	4549	0	0
May 31	802.2	4753	+204	+3.3
June 30	802.1	4701	-52	-0.9
July 31	802.4	4857	+156	+2.5
Aug. 31	802.2	4753	-104	-1.7
Sept. 30	*802.3	4805	+52	+0.9
WTR YR 1980	--	--	+156	+0.2

*Estimated

04161800 STONY CREEK NEAR WASHINGTON, MI

LOCATION.--Lat 42°42'55", long 83°05'31", in SW¼ sec.31, T.4 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) downstream from bridge on Mt. Vernon Road, 500 ft (152 m) downstream from Stony Lake Dam, and 2.9 mi (4.7 km) west of Washington.

DRAINAGE AREA.--68.2 mi^2 (176.6 km^2).

PERIOD OF RECORD.--July 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 772.59 ft (235.485 m) National Geodetic Vertical Datum of 1929 (levels by Huron-Clinton Metropolitan Authority).

REMARKS.--Records good. Occasional diurnal fluctuation caused by mills above station prior to February 1963; occasional regulation by Stony Lake since (station 04161790). Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 41.4 ft^3/s (1.172 m^3/s), 8.24 in/yr (209 mm/yr), adjusted for storage since 1963.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 427 ft^3/s (12.1 m^3/s) Feb. 2, 1968, gage height, 5.86 ft (1.786 m); maximum gage height, 6.71 ft (2.045 m) Mar. 6, 1959, backwater from ice; minimum discharge 0.9 ft^3/s (0.025 m^3/s) July 10, 1963; minimum gage height, 1.79 ft (0.546 m) Apr. 6, 1979; minimum daily discharge, 1.3 ft^3/s (0.037 m^3/s) July 31, Aug. 1, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 283 ft^3/s (8.01 m^3/s) Dec. 25, gage height, 5.11 ft (1.558 m); minimum, 2.6 ft^3/s (0.074 m^3/s) Mar. 18, gage height, 1.84 ft (0.561 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.1	32	47	64	17	23	102	35	29	14	61	24
2	19	26	45	62	16	22	102	50	28	22	60	27
3	18	23	41	56	16	21	103	61	37	19	77	27
4	16	20	38	49	16	20	164	60	40	18	77	25
5	16	18	38	44	16	20	183	45	38	22	77	23
6	18	19	40	38	16	20	173	30	39	23	92	21
7	20	18	43	39	16	20	151	25	45	21	78	18
8	18	17	43	36	16	22	137	18	59	54	67	17
9	19	20	39	33	17	24	145	23	60	77	60	21
10	41	22	36	30	16	23	146	26	58	78	54	23
11	41	22	34	38	16	23	135	30	58	64	53	21
12	36	21	38	42	16	22	126	33	57	53	60	20
13	32	20	34	42	16	23	116	45	51	47	54	24
14	28	18	32	40	16	24	122	55	44	40	48	31
15	24	18	30	38	17	23	143	64	40	35	44	31
16	20	35	30	38	18	23	150	65	31	34	39	29
17	17	40	27	40	17	76	140	67	24	35	35	41
18	17	38	24	45	17	128	126	109	22	31	34	45
19	18	38	24	45	16	87	111	118	24	28	32	44
20	18	35	24	43	17	85	104	114	27	26	32	39
21	20	33	23	39	19	118	93	102	26	25	50	37
22	70	33	26	37	28	125	84	88	24	33	65	38
23	58	40	32	34	32	119	75	74	23	31	51	45
24	74	50	55	28	33	117	64	65	21	27	40	42
25	64	56	129	26	33	114	58	62	20	24	33	39
26	93	50	114	24	28	104	54	48	18	22	28	36
27	73	64	110	23	27	97	51	39	19	29	24	33
28	40	56	101	21	26	96	37	35	14	59	24	31
29	92	52	90	20	25	99	39	32	15	68	21	28
30	92	50	77	19	---	98	47	29	14	68	20	26
31	44	---	70	18	---	101	---	31	---	65	21	---
TOTAL	1163.1	984	1534	1151	579	1917	3281	1678	1005	1192	1511	906
MEAN	37.5	32.8	49.5	37.1	20.0	61.8	109	54.1	33.5	38.5	48.7	30.2
MAX	93	64	129	64	33	128	183	118	60	78	92	45
MIN	7.1	17	23	18	16	20	37	18	14	14	20	17
MEAN◆	21.8	34.3	48.0	35.6	20.0	77.3	109	57.4	32.6	41.0	47.0	31.1
CFSM◆	.32	.50	.70	.52	.29	1.13	160	.84	.48	.60	.69	.46
IN◆	.37	.56	.81	.60	.32	1.31	1.79	.97	.53	.69	.80	.51

CAL YR 1979 TOTAL 13217.3 MEAN 36.2 MAX 186 MIN 2.1 MEAN◆ 36.6 CFSM◆ .54 IN◆ 7.28
WTR YR 1980 TOTAL 16901.1 MEAN 46.2 MAX 183 MIN 7.1 MEAN◆ 46.4 CFSM◆ .68 IN◆ 9.26

◆ Adjusted for change in contents in Stony Lake.

04161820 CLINTON RIVER AT STERLING HEIGHTS, MI

LOCATION.--Lat 42°36'52", long 83°01'36", in NE¼ SW¼ sec.3, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on Riverland Road at Sterling Heights.

DRAINAGE AREA.--309 mi^2 (800 km^2).

PERIOD OF RECORD.--October 1978 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 625 ft (190 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for periods of no gage-height record, Jan. 12 to Mar. 18 and June 19 to Aug. 12, which are fair. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,500 ft^3/s (70.8 m^3/s) Apr. 14, 1979; minimum, 65 ft^3/s (1.84 m^3/s) Sept. 7, 10, 1979, gage height, 6.77 ft (2.063 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft^3/s (25.5 m^3/s) and maximum (*):

Date	Time	Discharge		Gage height		Date	Time	Discharge		Gage height	
		(ft^3/s)	(m^3/s)	(ft)	(m)			(ft^3/s)	(m^3/s)	(ft)	(m)
Dec. 25	unknown	1000	28.3	unknown		Apr. 9	0800	912	25.8	11.45	3.490
Mar. 17	unknown	*1370	38.8	*13.27	4.045	Apr. 15	0500	1260	35.7	12.83	3.911
Mar. 21	1500	972	27.5	11.69	3.563	May 18	0900	990	28.0	11.76	3.584
Apr. 4	1500	1350	38.2	13.20	4.023						

Minimum discharge, 78 ft^3/s (2.21 m^3/s) Oct. 1, gage height, 6.88 ft (2.097 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	187	294	290	170	150	464	412	231	120	200	258
2	234	179	271	280	160	140	468	395	229	120	290	230
3	128	161	255	270	160	150	473	349	298	125	440	242
4	127	152	256	250	160	160	1110	340	236	125	300	205
5	137	150	295	250	160	170	843	280	197	160	370	175
6	169	150	303	230	160	140	679	210	304	130	450	150
7	174	158	290	240	150	145	614	190	277	130	360	141
8	141	152	297	230	150	150	601	170	338	350	310	133
9	157	161	260	230	150	150	786	180	237	250	280	176
10	159	214	252	230	140	180	716	190	263	220	290	168
11	190	173	247	350	140	160	631	200	271	200	290	133
12	197	160	240	300	140	150	614	210	270	180	430	122
13	196	160	220	280	140	150	563	335	224	170	284	176
14	179	156	210	250	145	170	691	302	253	160	276	244
15	176	164	200	230	145	160	1050	271	263	150	256	198
16	180	185	200	250	140	400	755	237	271	170	239	198
17	180	171	190	300	130	1000	632	265	218	150	222	409
18	180	165	180	270	140	700	584	738	202	140	219	326
19	178	165	180	250	140	365	545	465	250	120	164	276
20	185	169	180	230	140	451	507	388	200	110	173	245
21	184	176	190	230	125	687	472	345	150	110	372	215
22	200	256	270	230	210	567	454	349	110	145	394	228
23	247	351	240	200	210	480	431	314	130	130	244	531
24	200	448	500	190	180	508	390	297	110	120	195	371
25	214	305	750	190	170	591	395	277	130	120	171	287
26	193	540	450	180	160	437	406	253	130	130	177	283
27	222	380	370	180	160	410	387	239	210	200	171	258
28	177	428	350	180	160	404	527	237	130	310	175	212
29	165	364	330	180	160	502	465	220	120	270	175	182
30	245	317	310	180	---	496	493	217	120	240	191	180
31	186	---	300	170	---	511	---	266	---	220	186	---
TOTAL	5581	6897	8880	7320	4495	10834	17746	9141	6372	5275	8294	6952
MEAN	180	230	286	236	155	349	592	295	212	170	268	232
MAX	247	540	750	350	210	1000	1110	738	338	350	450	531
MIN	81	150	180	170	125	140	387	170	110	110	164	122
CFSM	.58	.74	.93	.76	.50	1.13	1.92	.96	.69	.55	.87	.75
IN.	.67	.83	1.07	.88	.54	1.30	2.14	1.10	.77	.64	1.00	.84

CAL YR 1979 TOTAL 83181 MEAN 228 MAX 1250 MIN 68 CFSM .74 IN 10.01
WTR YR 1980 TOTAL 97787 MEAN 267 MAX 1110 MIN 81 CFSM .86 IN 11.77

04162010 Red Run near Warren, MI

LOCATION.--Lat 42°31'46", long 83°04'07", in SE¼ NE¼ sec.6, T.1 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank 15 ft (5 m) upstream from bridge on Ryan Road, and 1.0 mi (1.6 km) northwest of Warren.

DRAINAGE AREA.--Indeterminate.

PERIOD OF RECORD.--October 1979 to September 1980.

GAGE.--Water-stage recorder. Altitude of gage is 620 ft (189 m), from topographic map.

REMARKS.--Records poor. Diversion from Big Beaver Creek basin via Henry-Graham Drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year. Gage-height telemark at station.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1100 ft³/s (31.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	unknown	1500	42.5	unknown		June 3	0430	1100	31.2	15.1	4.60
Apr. 3	2330	2100	59.5	22.5	6.86	June 7	1630	1120	31.7	15.2	4.63
Apr. 14	1330	1220	34.6	15.9	4.85	Aug. 3	0400	*2110	59.8	*22.6	6.89
May 17	2200	1240	35.1	16.0	4.88						

Minimum discharge not determined; minimum daily, 1.1 ft³/s (0.031 m³/s) Feb. 4-20.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	13	29	6.0	2.5	1.4	2.5	40	16	24	3.0	3.9	71
2	62	9.1	5.0	2.4	1.3	2.1	35	12	16	2.7	138	32
3	49	5.0	4.5	2.3	1.2	2.5	203	9.5	257	2.7	437	14
4	19	3.2	4.5	2.3	1.1	2.7	518	7.7	32	2.8	14	9.5
5	40	2.4	6.0	2.2	1.1	8.0	61	10	15	29	53	6.3
6	24	3.6	7.0	2.0	1.1	4.3	35	6.9	137	5.3	34	3.7
7	13	6.0	10	2.0	1.1	4.9	34	6.8	192	4.0	7.2	3.4
8	6.4	3.1	14	2.0	1.1	5.3	68	5.0	47	115	11	3.2
9	9.8	24	14	2.0	1.1	9.9	90	4.8	23	8.7	5.0	62
10	6.2	22	12	2.0	1.1	47	80	4.4	17	4.6	15	11
11	18	5.5	6.0	69	1.1	24	40	9.4	9.4	3.7	52	4.0
12	17	3.9	10	34	1.1	8.5	52	5.5	7.1	12	66	4.8
13	6.1	4.0	8.0	9.0	1.1	8.4	30	41	5.8	5.0	14	78
14	3.3	3.1	6.0	8.1	1.1	14	397	15	12	3.5	8.0	29
15	2.7	16	5.0	7.6	1.1	19	112	6.3	57	3.6	4.6	12
16	3.8	10	4.5	6.9	1.1	42	53	5.2	23	17	3.4	9.3
17	3.5	4.5	4.0	20	1.1	457	34	162	9.6	6.4	9.3	151
18	2.8	3.1	3.5	13	1.1	58	27	304	7.4	6.2	12	22
19	2.8	3.7	3.5	9.3	1.1	29	17	36	37	3.3	4.8	8.5
20	2.6	2.8	3.5	6.7	1.1	27	13	18	35	3.2	26	6.0
21	2.6	6.7	3.0	5.8	4.0	430	14	12	7.1	3.6	92	4.5
22	2.6	83	3.0	5.0	155	70	13	9.3	5.1	4.7	30	91
23	3.5	121	90	4.5	17	39	10	7.0	4.6	6.9	9.6	80
24	2.6	138	100	4.0	6.6	79	9.7	14	4.5	3.9	5.3	15
25	2.1	43	500	3.0	4.3	63	17	6.4	4.7	3.8	4.4	9.1
26	2.0	201	370	2.5	4.1	32	9.1	4.6	5.4	33	4.3	6.9
27	1.9	30	95	2.0	3.6	24	19	5.1	56	43	5.7	4.4
28	2.2	86	25	2.0	3.9	22	53	5.5	6.7	305	4.6	3.6
29	1.8	68	20	1.9	3.1	61	34	5.3	4.8	24	5.8	3.7
30	1.8	18	15	1.7	---	30	28	63	3.7	10	171	4.1
31	2.1	---	10	1.6	---	85	---	86	---	5.3	53	---
TOTAL	330.2	958.7	1368.0	239.3	224.2	1711.1	2145.8	903.7	1065.9	684.9	1303.9	763.0
MEAN	10.7	32.0	44.1	7.72	7.73	55.2	71.5	29.2	35.5	22.1	42.1	25.4
MAX	62	201	500	69	155	457	518	304	257	305	437	151
MIN	1.8	2.4	3.0	1.6	1.1	2.1	9.1	4.4	3.7	2.7	3.4	3.2

WTR YR 1980 TOTAL 11698.7 MEAN 32.0 MAX 518 MIN 1.1

04162900 BIG BEAVER CREEK NEAR WARREN, MI

LOCATION.--Lat 42°32'31", long 83°02'52", in NW¼ SW¼ sec.33, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank between bridges on Mound Road, 1.0 mi (1.6 km) north of Warren, and 2.0 mi (3.2 km) upstream from mouth.

DRAINAGE AREA.--Indeterminate since 1976. Prior to 1976, 23.5 mi² (60.9 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 598.80 ft (182.514 m) Macomb County datum. Prior to Aug. 26, 1960, non recording gage and crest-stage gage at same site and datum.

REMARKS.--Records poor. Diversion from the basin via Henry-Graham drain started in 1976, is ongoing and increasing with further development of new drains. Several observations of water temperature were made during the year.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,240 ft³/s (35.1 m³/s) June 26, 1968, gage height, 14.45 ft (4.404 m); no flow on several days in June and July 1962, caused by unusual regulation above gage; minimum natural discharge, 0.01 ft³/s (<0.001 m³/s) Sept. 26, 1979.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 290 ft³/s (8.21 m³/s) July 28, gage height, 8.97 ft (2.734 m); minimum daily, 0.04 ft³/s (.001 m³/s) Oct. 18, Nov. 5, 6; minimum gage height, 4.71 ft (1.436 m) Nov. 6.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.05	.82	.93	.45	.10	.13	6.7	1.9	5.2	.22	1.4	7.2
2	2.8	.71	.82	.40	.09	.13	3.7	1.5	2.8	.33	14	4.4
3	.46	.33	.62	.35	.09	.12	14	1.4	58	.22	46	1.7
4	4.0	.09	.62	.30	.08	.11	124	1.2	5.2	.27	5.8	.82
5	3.4	.04	1.5	.25	.08	.10	22	1.2	1.2	4.4	5.3	.71
6	1.2	.04	1.2	.20	.08	.10	8.5	.93	20	1.2	3.7	1.5
7	.82	.11	1.2	.20	.07	.10	4.0	.82	39	.33	1.5	.82
8	.22	.07	1.1	.18	.07	.10	7.2	.71	21	26	1.2	.62
9	.33	1.9	.62	.17	.07	.10	19	.62	4.8	1.9	.82	5.3
10	.11	2.1	.46	.16	.07	.15	14	.71	2.1	.62	1.5	1.9
11	2.3	.46	.40	.20	.07	.20	4.0	.93	.93	.54	8.1	.82
12	2.1	.11	.35	.40	.07	.17	4.9	.82	.54	.94	20	.71
13	.39	.09	.35	.35	.07	.15	2.6	5.2	.39	.82	1.7	8.1
14	.18	.07	.30	.30	.07	.15	59	2.6	.82	.54	1.2	4.9
15	.09	.33	.30	.25	.07	.20	31	.82	11	.54	.94	2.8
16	.14	.82	.30	.35	.07	5.0	11	.62	4.8	1.4	.82	1.2
17	.07	.33	.30	.40	.07	58	4.4	16	.62	.94	.94	18
18	.04	.11	.30	.35	.07	18	3.1	50	.33	.54	1.5	4.4
19	.05	.05	.30	.30	.07	7.2	2.6	8.2	5.7	.54	.94	1.2
20	.09	.07	.30	.25	.07	2.1	2.1	1.7	5.2	.46	2.3	.82
21	.09	.11	.35	.25	.20	49	1.7	1.2	.46	.46	7.6	.71
22	.09	13	1.0	.20	.50	19	1.5	.82	.27	.54	2.8	7.2
23	.11	30	5.7	.20	.35	7.6	1.4	.71	.22	.62	1.1	11
24	.14	28	42	.20	.25	21	1.2	1.7	.27	.54	.71	1.5
25	.11	5.7	66	.15	.20	18	3.1	.82	.22	.54	.71	.94
26	.11	39	17	.15	.20	4.0	1.4	.46	.27	6.2	1.2	.94
27	.09	4.8	4.8	.15	.17	2.6	1.9	.46	2.3	14	.62	.71
28	.11	14	1.4	.12	.15	1.9	10	.39	.54	102	1.5	.71
29	.11	3.4	.93	.11	.13	10	4.4	.39	.27	11	.82	.54
30	.09	1.5	.71	.11	---	3.4	5.7	19	.27	2.8	1.7	.54
31	.14	---	.50	.10	---	19	---	43	---	1.7	5.3	---
TOTAL	20.03	148.16	152.66	7.55	3.65	247.81	380.1	166.83	194.72	183.15	143.72	92.71
MEAN	.65	4.94	4.92	.24	.13	7.99	12.7	5.38	6.49	5.91	4.64	3.09
MAX	4.0	39	66	.45	.50	58	124	50	58	102	46	18
MIN	.04	.04	.30	.10	.07	.10	1.2	.39	.22	.22	.62	.54

CAL YR 1979 TOTAL 1179.18 MEAN 3.23 MAX 93 MIN .02
WTR YR 1980 TOTAL 1741.09 MEAN 4.76 MAX 124 MIN .04

04163400 PLUM BROOK AT UTICA, MI

LOCATION.--Lat 42°36'05", long 83°04'27", in SE¼ NE¼ sec.7, T.2 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on left bank at upstream side of bridge on Ryan Road, 1.0 mi (1.6 km) southwest of Utica.

DRAINAGE AREA.--16.5 mi² (42.7 km²).

PERIOD OF RECORD.--July 1965 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 619.79 ft (188.912 m) National Geodetic Vertical Datum of 1929 (levels by Johnson & Anderson Inc.).

REMARKS.--Records good except those for the winter period, which are fair. Occasional diversion for sprinkler irrigation. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--15 years, 12.8 ft³/s (0.362 m³/s), 10.53 in/yr (267 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,160 ft³/s (32.9 m³/s) June 26, 1968, gage height, 10.36 ft (3.158 m); no flow part of each day July 19, 28, 1966, Aug. 22-28, Sept. 3, 11, 1969; minimum gage height, 1.23 ft (0.375 m) Sept. 16, 1967.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1600	200	5.66	5.88	1.792	Apr. 4	0600	*391	11.1	*8.05	2.454
Mar. 17	1700	274	7.76	7.06	2.152	Apr. 14	2100	235	6.66	6.57	2.003

Minimum discharge, 0.64 ft³/s (0.018 m³/s) July 26, gage height, 1.65 ft (0.503 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.1	3.8	9.9	9.8	2.0	2.5	37	14	11	2.6	4.0	15
2	11	5.9	7.6	8.0	2.0	2.5	30	12	9.0	2.2	6.0	14
3	7.9	4.2	7.8	7.0	1.7	2.2	36	9.6	48	2.2	36	9.9
4	5.4	2.8	7.6	6.0	1.6	2.1	245	8.5	17	1.8	12	5.4
5	9.8	2.0	7.3	5.0	1.5	2.1	54	8.2	9.9	2.9	20	4.4
6	5.6	2.4	8.9	4.5	1.5	2.1	32	6.8	66	3.3	53	3.8
7	6.8	2.3	8.5	4.2	1.4	2.1	28	4.9	49	1.9	12	3.3
8	5.2	2.1	7.9	4.0	1.4	2.1	33	4.0	47	13	7.1	2.9
9	4.9	2.8	5.6	3.8	1.4	2.1	74	4.2	26	8.7	5.6	5.8
10	2.8	5.4	5.7	3.8	1.4	3.0	64	4.0	17	3.8	5.1	6.5
11	3.6	4.0	6.2	5.0	1.4	4.3	37	4.4	12	2.1	7.9	3.1
12	6.2	2.8	5.6	8.5	1.4	3.8	33	4.9	8.2	2.2	12	2.6
13	4.5	2.4	6.6	7.0	1.4	3.3	26	8.5	6.3	3.1	5.4	9.0
14	3.1	3.9	5.2	6.5	1.4	3.0	105	11	4.7	1.7	3.5	18
15	3.1	5.4	6.2	6.0	1.4	4.0	102	6.5	8.5	2.9	2.9	19
16	9.7	5.9	4.5	7.0	1.4	40	48	5.4	12	3.7	2.1	9.0
17	9.7	3.3	4.0	8.5	1.4	198	31	11	8.5	2.8	2.2	37
18	9.2	2.5	5.1	8.0	1.4	61	22	118	6.0	1.7	5.6	18
19	7.7	2.3	6.3	7.5	1.5	25	17	38	7.3	1.6	4.4	9.6
20	2.9	2.3	4.4	7.0	1.5	22	15	20	15	1.4	5.1	7.1
21	2.3	2.6	4.1	6.5	4.0	132	14	14	6.8	1.2	45	6.3
22	3.2	12	9.2	6.0	7.5	68	12	10	4.4	3.3	35	8.5
23	3.9	25	15	5.5	9.5	38	9.9	7.3	3.5	2.4	14	37
24	2.2	38	60	4.5	7.5	52	8.2	6.8	3.7	1.2	10	12
25	2.4	19	158	4.0	5.0	57	9.9	6.3	4.7	1.0	8.5	7.6
26	2.0	57	63	3.5	4.0	32	9.0	4.9	3.7	1.2	4.7	6.0
27	2.4	27	30	3.0	3.2	27	7.9	4.2	11	5.1	4.9	4.0
28	2.7	30	22	3.0	2.8	30	22	5.6	5.4	51	3.7	3.5
29	1.9	21	17	2.5	2.5	45	19	3.7	3.1	18	3.1	3.7
30	1.8	14	14	2.5	---	34	22	4.4	2.9	7.3	6.8	3.7
31	2.0	---	11	2.3	---	52	---	15	---	5.4	7.3	---
TOTAL	147.0	314.1	534.2	170.4	76.1	954.2	1202.9	386.1	436.6	162.7	354.9	295.7
MEAN	4.74	10.5	17.2	5.50	2.62	30.8	40.1	12.5	14.6	5.25	11.4	9.86
MAX	11	57	158	9.8	9.5	198	245	118	66	51	53	37
MIN	1.1	2.0	4.0	2.3	1.4	2.1	7.9	3.7	2.9	1.0	2.1	2.6
CFSM	.29	.64	1.04	.33	.16	1.87	2.43	.76	.89	.32	.69	.60
IN.	.33	.71	1.20	.38	.17	2.15	2.71	.87	.98	.37	.80	.67

CAL YR 1979 TOTAL 4777.94 MEAN 13.1 MAX 320 MIN .77 CFSM .79 IN 10.77
WTR YR 1980 TOTAL 5034.90 MEAN 13.8 MAX 245 MIN 1.0 CFSM .84 IN 11.35

04163900 RED RUN NEAR CADY, MI

LOCATION.--Lat 42°34'08", long 82°58'14", in SW¼SW¼ sec. 19, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 50 ft (15 m) upstream from bridge on Utica Road, 200 ft (61 m) upstream from the mouth, 550 ft (168 m) downstream from Plum Brook, and 0.7 mi (1.1 km) northwest of Cady.

PERIOD OF RECORD.--October 1979 to September 1980 (gage heights only).

GAGE.--Water-stage recorder. Altitude of gage is 585 ft (178 m) from topographic map (nearest 5 ft).

REMARKS.--Records good.

EXTREMES FOR CURRENT YEAR.--Maximum gage height, 17.58 ft (5.358 m) Apr. 4; minimum recorded, 7.05 ft (2.149 m) Feb. 18.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	---	---		---	7.61	7.34	10.34	9.18	8.31	7.17	---	---
2	---	---		---	7.56	7.38	9.85	8.91	11.45	7.21	---	---
3	---	---		---	7.53	7.35	9.90	8.88	8.76	7.29	---	---
4	---	---		---	7.55	7.40	15.94	8.79	8.04	7.14	---	---
5	7.73	---		---	7.53	7.60	13.62	8.70	10.22	7.72	---	---
6	7.59	---		---	7.56	7.53	11.63	8.31	9.75	7.53	---	---
7	7.80	---		---	7.60	7.33	10.81	7.96	10.72	7.19	---	---
8	7.30	---		---	7.53	7.41	10.73	7.78	8.73	9.82	8.96	---
9	7.45	7.25		---	7.47	7.35	12.09	7.73	8.57	8.57	8.66	---
10	7.34	8.19		---	7.39	8.21	12.01	7.77	8.50	7.94	8.93	---
11	7.66	7.51		9.90	7.34	8.47	11.08	7.94	8.46	7.78	8.90	---
12	8.11	7.39		9.14	7.40	7.60	10.68	7.80	8.26	7.81	10.46	---
13	7.72	7.41		8.42	7.36	7.53	10.41	8.62	7.96	7.69	8.85	---
14	7.49	8.00		8.28	7.38	7.73	11.95	8.97	8.35	7.40	8.51	---
15	7.42	---		8.04	7.33	7.89	13.98	8.36	9.79	7.37	8.28	---
16	7.49	---		8.09	7.35	7.99	12.66	8.10	8.38	7.87	8.08	---
17	7.51	---		8.31	7.21	12.85	11.26	8.25	7.95	7.65	7.92	12.60
18	7.51	---		8.46	7.21	13.61	10.61	13.78	7.83	7.34	8.13	9.61
19	7.49	---		8.21	7.39	10.51	10.21	11.46	9.10	7.19	7.62	8.57
20	7.52	---		8.04	7.42	9.48	9.88	9.79	8.40	---	8.03	8.32
21	7.46	---		7.97	7.41	13.12	9.65	9.22	7.61	---	9.34	7.93
22	7.43	---		8.02	8.91	12.42	9.53	8.70	7.40	---	10.11	8.30
23	7.93	---		7.95	8.64	10.42	9.38	8.57	7.34	---	---	11.23
24	7.67	---		7.60	7.95	10.29	9.15	8.31	7.32	---	---	9.27
25	7.50	---		7.79	7.64	11.33	9.21	8.12	7.31	---	---	8.73
26	7.53	---		7.74	7.57	10.18	8.99	8.09	7.33	---	---	8.62
27	7.79	---		7.67	7.53	9.76	8.83	8.06	8.36	---	---	8.27
28	7.48	---		7.69	7.54	9.65	10.19	7.94	7.54	---	---	7.94
29	8.02	---		7.74	7.43	10.54	9.65	8.75	7.32	---	---	7.68
30	7.52	---		7.61	---	10.09	9.91	9.51	7.16	---	---	7.66
31	---	---		7.71	---	10.87	---	8.49	---	---	---	---
MEAN	---	---		---	7.56	9.27	10.80	8.74	8.41	---	---	---
MAX	---	---		---	8.91	13.61	15.94	13.78	11.45	---	---	---
MIN	---	---		---	7.21	7.33	8.83	7.73	7.16	---	---	---

04164000 CLINTON RIVER NEAR FRASER, MI

LOCATION.--Lat 42°34'40", long 82°57'00", in NW¼ sec.20, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 800 ft (244 m) downstream from bridge on Garfield Road, 2.8 mi (4.5 km) north of Fraser, and 4.0 mi (6.4 km) upstream from North Branch.

DRAINAGE AREA.--444 mi^2 (1,150 km^2).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 577.71 ft (176.086 m) National Geodetic Vertical Datum of 1929. Prior to Nov. 17, 1949, nonrecording gage at site 800 ft (244 m) upstream at same datum.

REMARKS.--Records good. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--33 years, 370 ft^3/s (10.48 m^3/s), 11.32 in/yr (288 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 8,000 ft^3/s (227 m^3/s) May 11, 1948, gage height, 19.5 ft (5.94 m), from graph based on gage readings, from rating curve extended above 4,000 ft^3/s (113 m^3/s); minimum, 47 ft^3/s (1.33 m^3/s) Sept. 6, 1955; minimum gage height, 4.29 ft (1.308 m) Sept. 7, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of April 5 or 6, 1947, reached a stage of 20 ft (6.1 m), from floodmarks, discharge, 9,000 ft^3/s (255 m^3/s), from rating curve extended above 4,000 ft^3/s (113 m^3/s).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 2,000 ft^3/s (56.6 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 25	1300	2600	73.6	14.06	4.285	Apr. 14	2000	2450	69.4	13.84	4.218
Mar. 17	1800	2390	67.7	13.71	4.179	May 18	0500	2240	63.4	13.60	4.145
Mar. 21	1600	2210	62.6	13.42	4.090	July 28	1300	2690	76.2	14.19	4.325
Apr. 4	0400	*4120	117	*15.62	4.761	Aug. 3	0900	3220	91.2	14.79	4.508

Minimum discharge, 104 ft^3/s (2.95 m^3/s) Oct. 1, gage height, 5.24 ft (1.597 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	113	244	373	384	240	200	754	517	377	157	293	653
2	375	255	339	366	231	202	655	467	352	161	656	386
3	219	188	311	372	232	191	683	461	953	171	2040	350
4	186	171	316	347	227	194	2990	441	446	154	688	300
5	264	162	333	328	222	238	1740	424	305	238	529	260
6	228	168	379	305	226	225	1060	353	704	214	879	230
7	270	192	351	315	233	196	860	295	654	164	581	210
8	185	175	372	309	222	209	850	264	751	616	480	210
9	211	232	315	295	215	201	1170	257	411	401	427	360
10	190	329	299	289	200	352	1160	263	383	286	463	320
11	238	205	304	589	195	373	926	288	375	262	447	220
12	318	181	317	523	203	235	835	265	362	262	787	230
13	252	176	318	378	199	228	774	408	312	250	463	350
14	210	176	288	355	201	262	1370	467	316	202	394	550
15	199	209	269	315	200	283	1840	358	474	197	355	450
16	209	241	268	324	203	301	1340	310	484	272	321	350
17	213	202	239	360	181	1560	963	459	316	242	291	840
18	212	180	242	389	192	1630	817	1790	274	191	330	780
19	214	177	277	343	206	805	729	868	318	170	246	550
20	223	181	257	315	214	573	663	589	491	150	306	420
21	213	191	247	302	210	1600	615	496	262	157	531	330
22	208	482	355	311	485	1300	586	451	203	175	748	380
23	287	750	473	299	406	764	558	419	184	188	386	1000
24	243	948	981	241	293	748	517	412	182	160	285	600
25	240	517	2040	272	245	968	528	358	181	149	246	500
26	205	1110	1250	264	235	717	485	323	182	194	246	450
27	253	635	678	253	229	633	459	302	317	310	235	390
28	208	756	540	255	230	610	722	302	223	1780	240	330
29	178	567	484	263	214	796	615	285	179	750	236	290
30	256	420	448	242	---	700	663	325	156	401	417	270
31	221	---	401	255	---	875	---	611	---	349	334	---
TOTAL	7041	10420	14064	10158	6789	18169	27927	13828	11127	9373	14880	12559
MEAN	227	347	454	328	234	586	931	446	371	302	480	419
MAX	375	1110	2040	589	485	1630	2990	1790	953	1780	2040	1000
MIN	113	162	239	241	181	191	459	257	156	149	235	210
CFSM	.51	.78	1.02	.74	.53	1.32	2.10	1.01	.84	.68	1.08	.94
IN.	.59	.87	1.18	.85	.57	1.52	2.34	1.16	.93	.79	1.25	1.05

CAL YR 1979 TOTAL 137340 MEAN 376 MAX 3840 MIN 101 CFSM .85 IN 11.51
WTR YR 1980 TOTAL 156335 MEAN 427 MAX 2990 MIN 113 CFSM .96 IN 13.10

04164100 EAST POND CREEK AT ROMEO, MI

LOCATION.--Lat 42°49'21", long 83°01'13", in NE¼ SE¼ sec.27, T.5 N., R.12 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) upstream from bridge on State Highway 53, and 1.4 mi (2.3 km) north of Romeo.

DRAINAGE AREA.--21.8 mi² (56.5 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 780 ft (238 m) from topographic map (nearest 10 ft).

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 15.3 ft³/s (0.433 m³/s), 9.53 in/yr (242 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 358 ft³/s (10.1 m³/s) Feb. 10, 1965, gage height, 4.48 ft (1.366 m); maximum gage height, 4.56 ft (1.390 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.8 ft³/s (0.023 m³/s) July 30, 31, 1964, Aug. 6, 7, 1965; minimum gage height, 0.71 ft (0.216 m) July 21, 1959.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft³/s (2.27 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 17	2000	*187	5.30	*3.27	0.997	Apr. 4	0500	92	2.61	2.42	0.738

Minimum discharge, 2.5 ft³/s (0.071 m³/s) Aug. 25, 26, 27; minimum gage height, 0.98 ft (0.299 m) Aug. 25, 26, 27, Sept. 9, 11, 12.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	3.7	11	20	19	6.0	7.0	39	29	15	3.3	11	7.2
2	7.4	9.5	19	18	6.0	7.0	36	28	14	2.8	12	7.2
3	8.1	7.5	18	16	6.0	7.0	37	26	19	2.9	17	6.7
4	14	6.3	17	14	6.0	7.0	84	25	17	3.0	13	6.1
5	12	3.4	17	14	6.0	7.0	66	23	15	7.7	12	5.7
6	8.7	3.2	20	13	6.2	7.0	58	21	19	7.9	15	5.4
7	6.7	3.6	18	13	6.2	7.0	49	20	24	6.9	13	5.2
8	5.2	3.8	16	13	6.2	7.0	45	19	31	48	12	4.9
9	5.7	7.1	15	13	6.2	7.0	51	18	22	34	11	3.9
10	4.5	9.0	14	13	6.2	7.5	49	18	23	20	9.7	3.4
11	4.5	9.0	14	20	6.2	7.5	45	17	21	16	9.9	2.8
12	5.7	8.3	15	17	6.2	7.5	43	17	19	12	13	2.8
13	12	7.4	14	16	6.2	7.5	39	21	18	9.0	10	13
14	10	6.6	13	15	6.2	7.5	46	24	17	5.3	9.9	18
15	7.4	4.5	12	14	6.2	7.5	62	23	16	5.1	8.8	14
16	5.8	5.1	11	15	6.2	12	54	21	16	5.4	7.4	11
17	3.8	4.5	11	16	6.2	90	46	22	15	5.1	6.5	19
18	3.4	10	10	18	6.5	119	36	46	14	4.7	6.2	17
19	3.5	9.2	9.5	17	6.5	55	33	37	15	4.9	3.1	14
20	4.1	7.5	8.5	16	7.0	47	34	32	18	4.4	2.9	13
21	4.2	6.6	9.5	14	7.0	54	32	29	15	4.1	4.4	11
22	6.6	5.7	10	13	12	47	29	26	12	4.5	13	5.2
23	6.6	15	14	12	10	41	27	20	4.5	4.0	9.9	17
24	3.5	24	20	10	9.0	40	25	20	9.2	3.5	7.1	14
25	7.1	21	49	9.0	8.0	41	25	20	9.8	3.1	2.7	12
26	7.2	34	48	8.5	7.5	35	23	19	9.2	3.3	2.6	12
27	6.0	29	34	8.0	7.5	35	23	18	8.9	6.0	2.6	11
28	4.6	27	30	7.5	7.5	38	28	16	8.7	10	2.8	8.9
29	3.5	25	28	7.0	7.0	39	31	15	8.2	15	5.0	8.2
30	3.6	22	23	6.5	---	37	31	15	7.0	14	8.6	7.6
31	3.5	---	20	6.5	---	39	---	16	---	14	6.7	---
TOTAL	192.6	345.8	577.5	412.0	199.9	477.0	1226	701	460.5	289.9	268.8	287.2
MEAN	6.21	11.5	18.6	13.3	6.89	28.3	40.9	22.6	15.4	9.35	8.67	9.57
MAX	14	34	49	20	12	119	84	46	31	48	17	19
MIN	3.4	3.2	8.5	6.5	6.0	7.0	23	15	4.5	2.8	2.6	2.8
CFSM	.29	.53	.85	.61	.32	1.30	1.88	1.04	.71	.43	.40	.44
IN.	.33	.59	.99	.70	.34	1.50	2.09	1.20	.79	.49	.46	.49

CAL YR 1979 TOTAL 5674.6 MEAN 15.5 MAX 150 MIN 2.3 CFSM .71 IN 9.68
WTR YR 1980 TOTAL 5838.2 MEAN 16.0 MAX 119 MIN 2.6 CFSM .73 IN 9.96

04164300 EAST BRANCH COON CREEK AT ARMADA, MI

LOCATION.--Lat 42°50'45", long 82°53'06", in NE¼ sec.23, T.5 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 10 ft (3 m) downstream from bridge on Prospect Street in Armada.

DRAINAGE AREA.--13.0 mi² (33.7 km²).

PERIOD OF RECORD.--October 1958 to current year.

GAGE.--Water-stage recorder and concrete control. Altitude of gage is 735 ft (224 m) from topographic map (nearest 5 ft).

REMARKS.--Records good except those for period of no gage-height record, Feb. 4 to Mar. 19, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 6.47 ft³/s (0.183 m³/s), 6.76 in/yr (172 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 910 ft³/s (25.8 m³/s) Apr. 19, 1975, gage height, 6.69 ft (2.039 m); no flow Jan. 25 to Feb. 10, 1961, result of freezeup.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 100 ft³/s (2.83 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1300	196	5.55	3.53	1.076	Mar. 25	0100	116	3.29	2.94	0.896
Mar. 17	unknown	270	7.65	unknown		Apr. 4	0300	*479	13.6	*5.06	1.542
Mar. 21	1400	109	3.09	2.87	0.875	Apr. 14	1800	244	6.91	3.83	1.167

Minimum daily discharge, 0.09 ft³/s (0.003 m³/s) July 21, 25.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	.10	.20	1.2	3.8	.69	.48	33	8.6	1.0	.21	.84	.69
2	.33	.15	1.0	3.2	.62	.45	19	6.0	.85	.24	1.3	.66
3	.15	.14	.86	2.7	.56	.40	31	4.6	1.7	.16	1.5	.47
4	.16	.14	.79	2.4	.45	.40	256	3.8	1.2	.16	1.1	.37
5	.14	.16	.83	2.0	.37	.40	61	2.9	.88	.20	1.0	.31
6	.16	.19	2.0	1.6	.30	.40	34	2.5	1.7	.16	.91	.23
7	.26	.19	2.9	1.5	.30	.40	18	2.2	6.0	.15	1.1	.20
8	.26	.15	2.4	1.4	.30	.40	14	2.0	5.8	2.3	1.0	.19
9	.49	.34	2.0	1.3	.30	.40	27	1.7	2.7	2.2	.68	.66
10	.17	.33	1.5	1.1	.30	.40	31	1.5	2.1	1.3	.51	.29
11	.19	.19	1.3	2.8	.30	.60	17	1.4	1.6	.75	.76	.22
12	.23	.16	1.3	4.9	.31	.75	18	1.3	1.2	.55	1.5	.20
13	.32	.14	1.5	4.4	.31	.60	14	2.2	.97	.42	1.3	1.3
14	.29	.14	1.2	2.9	.31	.55	88	3.0	.99	.33	.86	1.1
15	.21	.25	1.1	2.4	.31	.55	89	2.3	.99	.25	.58	.74
16	.19	.24	.91	2.1	.31	1.0	39	1.9	.92	.25	.43	.53
17	.22	.18	.76	2.9	.31	55	16	2.5	.77	.17	.34	4.1
18	.26	.18	.69	4.2	.31	80	10	43	.60	.14	.32	2.1
19	.37	.17	.56	3.6	.33	35	7.4	21	1.1	.11	.27	1.3
20	.33	.17	.50	2.7	.35	14	6.0	9.0	2.5	.11	.31	.97
21	.30	.24	.44	2.4	.40	72	5.1	5.3	1.3	.09	2.5	.63
22	.20	.80	.76	2.1	.90	40	4.2	3.7	.82	.53	.99	.64
23	.12	1.7	1.5	1.8	1.6	29	3.8	3.0	.62	.17	.55	.93
24	.28	2.0	15	1.7	2.0	49	3.2	2.4	.50	.12	.40	1.1
25	.13	1.3	136	1.6	1.3	59	2.9	1.9	.49	.09	.32	1.0
26	.13	3.5	48	1.4	.80	27	2.5	1.6	.42	.23	.23	1.1
27	.16	2.4	18	1.3	.65	29	2.4	1.3	.35	3.6	.20	.86
28	.21	2.4	9.1	.99	.55	20	4.0	1.1	.29	4.4	.16	.76
29	.11	2.4	6.3	.83	.50	18	7.0	1.0	.27	1.6	.31	.69
30	.16	2.0	5.1	.76	---	14	13	.98	.20	1.1	.37	.67
31	.16	---	4.6	.69	---	32	---	1.1	---	1.2	.39	---
TOTAL	6.79	22.55	270.10	69.47	16.04	580.18	876.5	146.78	40.83	23.29	23.03	25.01
MEAN	.22	.75	8.71	2.24	.55	18.7	29.2	4.73	1.36	.75	.74	.83
MAX	.49	3.5	136	4.9	2.0	80	256	43	6.0	4.4	2.5	4.1
MIN	.10	.14	.44	.69	.30	.40	2.4	.98	.20	.09	.16	.19
CFSM	.02	.06	.67	.17	.04	1.44	2.25	.36	.11	.06	.06	.06
IN.	.02	.06	.77	.20	.05	1.66	2.51	.42	.12	.07	.07	.07

CAL YR 1979 TOTAL 1862.40 MEAN 5.10 MAX 223 MIN .06 CFSM .39 IN 5.33
WTR YR 1980 TOTAL 2100.57 MEAN 5.74 MAX 256 MIN .09 CFSM .44 IN 6.01

04164500 NORTH BRANCH CLINTON RIVER NEAR MOUNT CLEMENS, MI

LOCATION.--Lat 42°37'45", long 82°53'25", in SW¼ sec.35, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank 30 ft (9 m) upstream from bridge on State Highway 59, 2 mi (3 km) north of Mount Clemens, and 3.6 mi (5.8 km) upstream from mouth.

DRAINAGE AREA.--199 mi² (515 km²).

PERIOD OF RECORD.--May 1947 to current year.

REVISED RECORDS.--WSP 1437: 1948. WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since September 1961. Datum of gage is 576.38 ft (175.681 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Nov. 15, 1949, nonrecording gage at same site and datum.

REMARKS.--Records good. Some regulation at times by mill above station. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--33 years, 120 ft³/s (3.398 m³/s), 8.19 in/yr (208 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 6,700 ft³/s (190 m³/s) Feb. 2, 1968, gage height, 18.62 ft (5.675 m); minimum, 0.2 ft³/s (0.006 m³/s) Sept. 13, 14, 1954, July 30, 1965; minimum gage height, 3.12 ft (0.951 m) Sept. 13, 14, 1954.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood of Apr. 5 or 6, 1947, reached a stage of 20.0 ft (6.10 m), from floodmark.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft³/s (34.0 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft	Gage height (m)
Dec. 26	2300	1200	34.0	12.03	3.667	Apr. 5	0700	*2180	61.7	*14.01	4.270
Mar. 19	0300	2080	58.9	13.87	4.228						

Minimum discharge, 5.3 ft³/s (0.150 m³/s) Oct. 1, gage height, 4.08 ft (1.244 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	7.6	11	90	133	27	31	440	247	64	19	52	32
2	6.4	13	80	116	23	29	501	190	54	17	45	40
3	8.8	17	70	102	21	26	399	146	74	13	89	43
4	15	16	62	86	20	25	860	121	98	13	135	37
5	18	14	63	78	20	26	1920	104	74	14	82	29
6	20	14	66	78	20	27	1070	90	69	16	248	24
7	17	15	91	65	21	24	559	79	125	18	177	21
8	17	16	91	58	21	26	360	71	457	107	80	19
9	14	18	81	50	21	25	332	65	501	210	60	18
10	14	20	76	44	21	25	430	61	213	123	52	23
11	14	21	64	54	21	40	481	59	127	65	46	24
12	14	25	61	81	20	51	398	57	93	47	85	21
13	14	22	63	97	20	44	333	58	71	38	105	20
14	17	20	62	104	20	37	328	86	59	32	63	39
15	18	19	50	80	21	38	713	117	57	26	47	61
16	17	20	51	71	21	54	1040	98	58	23	37	49
17	15	21	49	75	21	356	681	83	53	23	31	53
18	14	21	36	93	21	1230	416	326	46	21	29	155
19	12	23	44	104	21	1650	261	668	41	19	27	119
20	11	22	40	96	22	676	200	588	47	18	27	71
21	12	24	38	86	23	527	172	258	63	16	43	52
22	12	36	42	80	34	941	148	152	54	15	250	46
23	14	76	58	67	91	769	130	114	40	26	207	91
24	17	103	127	63	113	539	116	91	29	22	75	97
25	15	140	454	45	76	540	106	78	27	18	47	65
26	15	180	1000	44	52	619	99	67	26	15	34	48
27	14	140	1030	37	37	425	93	57	27	18	26	43
28	13	160	601	35	38	343	101	51	24	65	22	38
29	12	130	320	34	36	357	159	46	22	158	20	34
30	12	110	203	31	---	383	233	46	21	103	20	30
31	11	---	157	28	---	372	---	70	---	68	27	---
TOTAL	430.8	1467	5320	2215	923	10255	13079	4344	2714	1386	2288	1442
MEAN	13.9	48.9	172	71.5	31.8	331	436	140	90.5	44.7	73.8	48.1
MAX	20	180	1030	133	113	1650	1920	668	501	210	250	155
MIN	6.4	11	36	28	20	24	93	46	21	13	20	18
CFSM	.07	.25	.86	.36	.16	1.66	2.19	.70	.46	.23	.37	.24
IN.	.08	.27	.99	.41	.17	1.92	2.44	.81	.51	.26	.43	.27

CAL YR 1979 TOTAL 38214.1 MEAN 105 MAX 1720 MIN 2.5 CFSM .53 IN 7.14
WTR YR 1980 TOTAL 45863.8 MEAN 125 MAX 1920 MIN 6.4 CFSM .63 IN 8.57

04164800 MIDDLE BRANCH CLINTON RIVER AT MACOMB, MI

LOCATION.--Lat 42°42'23", long 82°57'33", in SW¼ sec.5, T.3 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on left bank at downstream side of bridge on Romeo Plank Road, 0.4 mi (0.6 km) north of Macomb.

DRAINAGE AREA.--41.0 mi² (106.2 km²).

PERIOD OF RECORD.--Water years 1959-62, 1969 (annual maximum and occasional low-flow measurements), October 1962 to September 1968, October 1969 to current year.

GAGE.--Water-stage recorder. Datum of gage is 603.23 ft (183.865 m) National Geodetic Vertical Datum of 1929 (levels by Corps of Engineers). Oct. 28, 1958, to Nov. 14, 1962, and Oct. 12, 1968, to Dec. 17, 1969, crest-stage gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--17 years, 27.1 ft³/s (0.767 m³/s), 8.98 in/yr (228 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,580 ft³/s (44.7 m³/s) June 26, 1968; maximum gage height, 16.16 ft (4.926 m) Mar. 12, 1962, backwater from ice; minimum discharge, 0.10 ft³/s (0.003 m³/s) July 22, 1971; minimum gage height, 4.68 ft (1.426 m) July 11, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1300	524	14.8	9.76	2.975	Apr. 14	1900	521	14.8	9.76	2.975
Mar. 17	1300	ice jam		*12.89	3.929	May 18	0700	406	11.5	8.88	2.707
Mar. 17	1500	782	22.1	11.64	3.548	July 8	1100	420	11.9	8.88	2.707
Mar. 21	1900	411	11.6	8.91	2.716	Aug. 6	0100	473	13.4	9.41	2.868
Apr. 4	0500	942	26.7	12.68	3.865	Aug. 21	2300	*945	26.8	12.71	3.874

Minimum discharge, 2.2 ft³/s (0.062 m³/s) July 3, 4, gage height, 4.97 ft (1.515 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	7.9	18	25	6.5	9.0	93	42	7.0	4.1	17	19
2	18	9.7	17	23	6.0	8.0	71	33	8.3	3.7	37	19
3	5.3	6.2	25	19	6.0	7.5	85	25	23	2.8	94	15
4	4.5	5.3	22	18	6.0	7.5	543	20	12	2.5	30	11
5	6.8	6.2	16	17	6.0	7.5	123	17	8.5	5.3	87	9.2
6	5.3	6.2	24	15	6.0	7.5	78	14	17	4.1	178	7.2
7	8.5	6.2	21	14	6.0	7.5	64	12	63	3.3	41	6.3
8	5.3	5.7	20	12	6.0	7.5	72	11	57	178	26	5.7
9	5.7	6.2	22	11	6.0	7.5	127	11	30	33	21	14
10	5.3	17	12	10	6.0	10	110	10	26	18	18	11
11	5.7	10	13	15	6.0	14	70	10	20	11	30	7.9
12	11	10	14	19	6.0	12	71	9.6	15	9.1	80	7.8
13	8.5	10	12	23	6.0	11	57	24	12	9.1	25	21
14	6.2	7.9	12	19	6.0	11	220	28	14	5.7	17	24
15	5.7	9.7	12	16	6.0	12	190	20	16	4.9	12	16
16	4.9	14	11	16	6.0	25	97	16	15	6.2	8.7	12
17	4.9	11	11	19	6.0	614	62	26	12	5.7	8.3	58
18	4.9	9.1	11	21	6.0	123	52	279	10	4.5	11	34
19	4.9	6.2	11	22	6.0	54	44	88	13	3.7	8.3	20
20	4.9	8.0	10	18	6.5	49	37	53	24	3.7	9.1	16
21	6.2	9.0	10	17	7.0	286	32	39	12	3.1	286	13
22	6.2	16	15	13	10	128	28	30	9.1	16	279	24
23	5.7	33	35	12	17	83	24	21	7.4	5.7	53	52
24	5.7	50	148	11	30	118	21	16	6.2	4.1	29	22
25	5.3	22	351	10	20	118	21	13	5.7	3.4	21	16
26	4.9	85	104	9.0	14	70	19	8.8	4.9	3.7	17	14
27	4.9	33	57	8.5	10	64	19	7.5	6.8	21	12	11
28	4.9	55	42	8.0	10	63	44	6.5	5.3	130	9.5	10
29	5.3	35	36	7.5	9.5	87	56	5.8	5.3	49	9.1	9.3
30	4.9	22	31	7.0	---	74	57	6.2	4.1	37	12	9.1
31	4.9	---	28	7.0	---	116	---	10	---	22	11	---
TOTAL	187.7	532.5	1171	462.0	248.5	2211.5	2587	912.4	469.6	613.4	1497.0	514.5
MEAN	6.05	17.8	37.8	14.9	8.57	71.3	86.2	29.4	15.7	19.8	48.3	17.2
MAX	18	85	351	25	30	614	543	279	63	178	286	58
MIN	2.5	5.3	10	7.0	6.0	7.5	19	5.8	4.1	2.5	8.3	5.7
CFSM	.15	.43	.92	.36	.21	1.74	2.10	.72	.38	.48	1.18	.42
IN.	.17	.48	1.06	.42	.23	2.01	2.35	.83	.43	.56	1.36	.47

CAL YR 1979 TOTAL 9765.6 MEAN 26.8 MAX 546 MIN 2.0 CFSM .65 IN 8.86
WTR YR 1980 TOTAL 11407.1 MEAN 31.2 MAX 614 MIN 2.5 CFSM .76 IN 10.35

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI
(National stream-quality accounting network and pesticide station)

LOCATION.--Lat 42°35'45", long 82°54'35", Macomb County, Hydrologic Unit 04090003, on left bank 20 ft (6 m) downstream from bridge on Moravian Drive, 0.2 mi (0.3 km) downstream from North Branch, and 0.5 mi (0.8 km) west of Mount Clemens.

DRAINAGE AREA.--734 mi^2 (1,901 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--May 1934 to current year.

REVISED RECORDS.--WSP 1084: 1943, 1945-46. WSP 1937: 1935, 1936(M), 1937-39, 1949(M), 1950. WSP 1557: Drainage area. WSP 1727: 1952(M), 1954(M).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929. May 10, 1934, to Jan. 11, 1939, nonrecording gage at same site and datum. Auxiliary gage is a water-stage recorder on right bank 2.0 mi (3.2 km) downstream from base gage at same datum. Mar. 15, 1938, to Jan. 3, 1952, auxiliary nonrecording gage 1.6 mi (2.6 km) downstream from base gage at same datum.

REMARKS.--Water-discharge records good except those for period of no gage-height record, Dec. 19 to Jan. 22, which are fair. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--46 years, 525 ft^3/s (14.87 m^3/s), 9.71 in/yr (247 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 21,200 ft^3/s (600 m^3/s) Apr. 6, 1947, gage height, 23.55 ft (7.178 m), from floodmark; minimum not determined; minimum gage height, 2.72 ft (0.829 m) Nov. 29, 1963.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,000 ft^3/s (85.0 m^3/s) and maximum (*):

Date	Time	Discharge		Gage height	
		(ft^3/s)	(m^3/s)	(ft)	(m)
Dec. 25	unknown	3200	90.6	unknown	
Mar. 19	0200	3450	97.7	9.86	3.005
Mar. 22	0500	3210	90.9	9.54	2.908
Apr. 4	1600	*5040	143	*11.69	3.563
Apr. 15	0500	3190	90.3	9.65	2.941

Minimum daily discharge, 167 ft^3/s (4.73 m^3/s) Oct. 1; minimum gage height, 5.01 ft (1.527 m) Dec. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	167	275	557	580	290	260	1480	839	491	213	384	750
2	421	295	483	540	280	250	1350	722	464	196	660	485
3	327	225	435	520	275	240	1280	659	1080	215	2080	410
4	215	200	449	480	270	250	4450	606	668	204	1040	360
5	333	195	459	450	270	285	4400	561	453	245	695	300
6	270	191	519	425	270	260	2560	489	783	269	1450	260
7	346	225	528	420	275	245	1600	387	797	225	918	250
8	211	210	516	410	265	255	1340	333	1480	873	656	250
9	259	270	456	390	255	245	1750	313	999	740	555	422
10	210	398	417	370	240	415	1860	339	690	460	560	386
11	242	250	423	690	240	450	1610	358	560	341	547	247
12	376	230	419	670	240	310	1400	323	495	312	1020	263
13	316	223	444	540	240	300	1250	457	414	289	674	413
14	247	220	407	510	240	335	1760	606	376	233	500	650
15	233	255	375	440	240	360	3080	519	517	214	446	492
16	254	285	389	445	245	410	2750	450	640	310	383	405
17	253	237	331	490	220	1960	1800	495	421	295	367	984
18	251	223	315	520	235	3200	1320	2390	346	240	348	910
19	249	222	335	495	250	2860	1050	1930	376	205	314	619
20	253	230	325	460	255	1540	909	1360	612	185	377	496
21	247	240	315	435	255	2290	841	889	372	190	623	379
22	242	535	425	425	567	2870	791	696	293	220	1570	431
23	325	903	610	405	618	1890	722	612	260	237	842	1210
24	282	1200	1320	340	466	1550	655	564	251	233	470	745
25	280	727	2900	350	372	1870	663	484	241	192	351	567
26	245	1400	2500	335	323	1570	609	410	229	209	323	525
27	285	1010	1870	320	311	1240	574	376	327	355	295	436
28	240	1070	1790	320	295	1100	873	367	281	1840	306	379
29	210	903	890	320	342	1360	848	347	200	1220	280	325
30	285	658	740	300	---	1290	987	331	212	607	462	310
31	260	---	630	310	---	1540	---	763	---	480	370	---
TOTAL	8334	13497	22572	13705	8644	33000	46562	19975	15328	12047	19866	14659
MEAN	269	450	728	442	298	1065	1552	644	511	389	641	489
MAX	421	1400	2900	690	618	3200	4450	2390	1480	1840	2080	1210
MIN	167	191	315	300	220	240	574	313	200	185	280	247
CFSM	.37	.61	.99	.60	.41	1.45	2.11	.88	.70	.53	.87	.67
IN.	.42	.68	1.14	.69	.44	1.67	2.36	1.01	.78	.61	1.01	.74

CAL YR 1979 TOTAL 202996 MEAN 556 MAX 4950 MIN 115 CFSM .76 IN 10.29
WTR YR 1980 TOTAL 228139 MEAN 623 MAX 4450 MIN 167 CFSM .85 IN 11.56

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1975 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: October 1974 to current year.
WATER TEMPERATURES: October 1974 to current year.

INSTRUMENTATION.--Water-quality monitor since Aug. 13, 1975.

REMARKS.--Biological Data (Phytoplankton) is for the 1979-80 water years.

COOPERATION.--Pesticide samples were collected by U.S. Geological Survey and analyzed by Environmental Protection Agency.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum (water years 1975, 1978-80), 3,580 micromhos Jan. 26, 1978; minimum recorded (water years 1975, 1976, 1978-80), 126 micromhos, July 29, 1976.
WATER TEMPERATURES: Maximum, 29.5°C Sept. 20, 1978; minimum, 0.0°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum, 2,470 micromhos Mar. 10, minimum, 299 micromhos July 28.
WATER TEMPERATURES: Maximum, 25.5°C July 20-22, Aug. 29-30; minimum, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
18...	0940	263	792	7.6	13.0	8.6	81	3000	1000	230	50	61
NOV												
21...	0950	215	707	8.0	8.0	10.0	85	330	K3700	230	54	61
DEC												
19...	1200	334	903	7.7	.5	12.2	89	3500	190	280	84	76
JAN												
23...	1000	351	800	7.9	1.0	12.8	93	310	130	290	93	78
FEB												
27...	1045	296	860	8.0	.0	12.2	85	490	K220	270	78	72
MAR												
26...	1100	1530	640	7.7	2.0	12.6	91	K1500	K2200	220	72	61
APR												
22...	1030	826	753	8.1	14.0	9.3	91	K120	K40	270	76	73
JUN												
04...	1045	592	655	7.6	18.0	6.6	70	--	--	220	60	60
25...	1000	208	867	8.1	21.0	6.8	76	K580	270	260	79	69
JUL												
23...	1130	182	752	8.0	23.0	6.6	77	K1600	280	250	77	66
AUG												
20...	1030	298	750	7.9	23.5	6.6	76	--	1200	260	82	72
SEP												
17...	1130	1030	663	7.5	17.0	6.0	63	3800	>2000	220	85	62

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
18...	19	0	53	1.5	42	4.8	220	0	180	8.8	60
NOV											
21...	18	0	46	1.3	39	4.6	210	0	172	3.4	61
DEC											
19...	22	--	67	1.7	43	4.9	240	0	197	7.7	68
JAN											
23...	23	--	56	1.4	29	4.7	240	0	197	4.8	68
FEB											
27...	21	0	64	1.7	34	5.4	230	0	189	3.7	68
MAR											
26...	17	--	38	1.1	27	3.9	180	0	148	5.7	49
APR											
22...	22	0	48	1.3	27	3.5	240	0	197	3.1	57
JUN											
04...	17	0	45	1.3	30	3.9	230	0	190	9.2	48
25...	21	--	63	1.7	34	5.0	240	0	200	2.8	58
JUL											
23...	20	0	57	1.6	33	5.1	210	0	170	3.3	58
AUG											
20...	20	0	54	1.5	30	5.3	240	0	180	4.4	59
SEP											
17...	17	--	48	1.4	31	5.7	190	0	140	8.6	51

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT 18...	82	.6	4.9	413	409	293	4.0	3.5	--	.050	.06
NOV 21...	82	.5	3.2	430	399	250	4.9	4.4	.070	.030	.08
DEC 19...	120	.5	5.7	538	508	485	6.0	5.7	.140	.000	.17
JAN 23...	99	.4	5.9	496	466	470	4.7	2.8	.330	.280	.40
FEB 27...	110	.4	6.0	507	473	405	3.0	3.0	.230	.190	.28
MAR 26...	70	.2	5.6	389	345	1610	2.5	2.5	.170	.170	.22
APR 22...	83	.3	3.5	463	419	1030	2.2	2.2	.120	.090	.15
JUN 04...	72	.3	5.5	457	358	730	2.2	2.2	.150	.150	.19
25...	97	.5	3.5	516	443	290	4.5	4.1	.080	.030	.10
JUL 23...	92	.5	4.7	489	422	240	3.9	3.6	.060	.020	.07
AUG 20...	87	.6	6.6	480	430	386	3.9	3.9	--	.140	.18
SEP 17...	78	.5	7.5	426	374	1190	4.6	4.6	--	.230	--

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT 18...	--	1.4	5.4	24	.280	.86	.170	--	28	20	100
NOV 21...	.90	.97	5.9	26	.140	.43	.110	6.8	7	4.1	100
DEC 19...	.96	1.1	7.1	31	.170	.52	.110	--	19	17	100
JAN 23...	.87	1.2	5.9	26	.190	.58	.160	--	11	10	100
FEB 27...	.97	1.2	4.2	19	.190	.58	.110	7.7	15	12	100
MAR 26...	.93	1.1	3.6	16	.140	.43	.050	8.5	47	194	100
APR 22...	1.3	1.4	3.6	16	.100	.31	.050	--	38	85	100
JUN 04...	1.1	1.2	3.4	15	.210	.64	.110	29	67	107	100
25...	.89	.97	5.5	24	.170	.52	.110	12	27	15	100
JUL 23...	.71	.77	4.7	21	.190	.58	.100	--	34	17	100
AUG 20...	--	.98	4.9	22	.120	.37	.080	7.2	45	36	100
SEP 17...	--	1.4	6.0	27	.530	1.6	.180	14	241	670	100

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

IDENTIFICATION OF PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
DEC 19...	1200	28	.00	.240	.240	.170	.000
FEB 27...	1045	35	102	1.81	2.05	2.35	.200
JUL 23...	1130	28	242	31.1	34.1	12.4	1.04

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT										
18...	0940	2	1	--	100	--	1	20	20	--
JAN										
23...	1000	4	3	--	70	--	0	--	--	--
APR										
22...	1030	5	5	--	70	0	0	30	20	--
JUL										
23...	1130	2	2	100	70	4	4	<10	10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT										
18...	0	--	3	160	20	--	0	100	30	.4
JAN										
23...	0	--	4	--	20	--	0	--	50	.2
APR										
22...	4	8	3	1200	20	7	1	90	40	.1
JUL										
23...	0	9	9	1200	10	--	16	80	30	.2

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT										
18...	.3	--	14	0	0	0	--	9	--	.6
JAN										
23...	.1	--	14	0	0	0	--	30	5.5	.4
APR										
22...	.1	6	4	--	0	0	30	--	6.4	.3
JUL										
23...	.1	10	8	0	0	0	30	8	9.0	.2

PESTICIDE ANALYSES

DATE	TIME	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)
NOV												
21...	0950	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB												
27...	1045	ND	ND	ND	ND	ND	ND	.32	ND	ND	ND	ND

DATE	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)	METH-OXY-CHLOR, TOTAL (UG/L)	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV												
21...	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
FEB												
27...	ND	ND	ND	ND	ND	ND	ND	ND	ND	--	--	--

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 9,78	MAR 13,79	MAY 24,79	JUN 20,79	JUL 20,79
TIME	1030	1130	1200	1030	1200
TOTAL CELLS/ML	6500	1800	3400	3200	5900
DIVERSITY: DIVISION	1.3	0.4	1.1	1.5	1.6
.CLASS	1.3	0.4	1.1	1.5	1.6
..ORDER	1.4	0.4	1.4	2.2	2.1
...FAMILY	1.6	0.6	2.0	2.7	3.2
....GENUS	1.7	1.2	2.3	3.3	3.6

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	60	1
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	--	-	120	2
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE	--	-	--	-	--	-	--	-	--	-
....ANKISTRODESMUS	86	1	--	-	26	1	39	1	120	2
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	210	6	690	12
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	58	1	--	-	*	0	360	11	--	-
....SELENASTRUM	--	-	--	-	--	-	52	2	--	-
....TETRAEDRON	--	-	--	-	--	-	*	0	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	52	2	--	-	--	-
....CRUCIGENIA	--	-	--	-	52	2	160	5	--	-
....SCENEDESMUS	850	13	14	1	1600#	46	780#	24	900#	15
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
....OUROCOCCUS	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	240	4
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	14	1	26	1	*	0	30	1
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	210	6	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	*	0	--	-	--	-	--	-	-	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 9,78		MAR 13,79		MAY 24,79		JUN 20,79		JUL 20,79	
TIME	1030		1130		1200		1030		1200	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	190	3	29	2	91	3	310	10	540	9
....MELOSIRA	--	-	--	-	52	2	*	0	--	-
....STEPHANODISCUS	--	-	--	-	*	0	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	30	1
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	210	4
...CYMBELLACEAE										
....CYMBELLA	--	-	14	1	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	14	1	--	-	--	-	30	1
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	490	8	--	-	--	-	--	-	--	-
....FRAGILARIA	58	1	--	-	310	9	--	-	--	-
....SYNEDRA	--	-	--	-	26	1	*	0	30	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	*	0	--	-	--	-	--	-	180	3
...NAVICULACEAE										
....DIPLONEIS	--	-	--	-	--	-	--	-	--	-
....MASTOGLOIA	--	-	--	-	--	-	--	-	--	-
....NAVICULA	--	-	--	-	78	2	*	0	450	8
....PLEUROSIGMA	--	-	--	-	--	-	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	130	2	14	1	1000#	30	65	2	960#	16
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	26	1	--	-	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	30	1
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	*	0	--	-	*	0	*	0	30	1
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	--	-	*	0	410	13	--	-
....COCCOCHLORIS	*	0	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	520#	16	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	1300#	74	--	-	--	-	240	4
....OSCILLATORIA	4500#	69	330#	18	--	-	--	-	870	15
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	120	2
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	29	2	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	*	0	--	-
....TRACHELOMONAS	72	1	--	-	*	0	39	1	--	-

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 15,79	SEP 13,79	NOV 21,79	MAR 26,80	JUN 4,80
TIME	1200	1145	0950	1100	1045
TOTAL CELLS/ML	3700	9500	11000	580	2400
DIVERSITY: DIVISION	1.2	1.4	1.1	0.9	1.3
.CLASS	1.2	1.4	1.1	1.2	1.3
..ORDER	1.5	2.4	1.3	1.9	1.8
...FAMILY	2.4	3.3	1.6	3.4	2.1
....GENUS	3.0	3.7	1.7	3.6	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	230	6	1600#	17	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	52	2
...OOCYSTACEAE	--	-	--	-	--	-	--	-	--	-
....ANKISTRODESMUS	260	7	--	-	62	1	65	11	13	1
....CHLORELLA	--	-	470	5	100	1	--	-	39	2
....CHODATELLA	39	1	130	1	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	--	-
....OOCYSTIS	150	4	270	3	--	-	--	-	--	-
....SELENASTRUM	--	-	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-	13	1
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	360	10	--	-	82	1	--	-	--	-
....SCENEDESMUS	1500#	41	400	4	120	1	--	-	130	5
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
....OUROCOCCUS	--	-	1300	13	890	8	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	90	2	200	2	--	-	35	6	52	2
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....CLOSTERIUM	--	-	--	-	--	-	--	-	--	-
....COSMARIUM	--	-	--	-	--	-	--	-	--	-

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 15,79 1200		SEP 13,79 1145		NOV 21,79 0950		MAR 26,80 1100		JUN 4,80 1045	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	150	4	1900#	20	310	3	60	10	64	3
....MELOSIRA	26	1	130	1	82	1	20	3	52	2
....STEPHANODISCUS	90	2	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	270	3	--	-	--	-	13	1
....COCCONEIS	--	-	200	2	82	1	5	1	--	-
....RHOICOSPHENIA	--	-	130	1	100	1	15	3	52	2
...CYMBELLACEAE										
....CYMBELLA	--	-	67	1	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	*	0	15	3	--	-
...EUNOTIACEAE										
....EUNOTIA	--	-	--	-	--	-	5	1	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	100	1	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-	--	-
....SYNEDRA	*	0	67	1	62	1	100#	17	13	1
...GOMPHONEMATACEAE										
....GOMPHONEMA	--	-	130	1	120	1	35	6	--	-
...NAVICULACEAE										
....DIPLONEIS	--	-	--	-	--	-	--	-	--	-
....MASTOGLOIA	--	-	67	1	--	-	--	-	--	-
....NAVICULA	39	1	270	3	250	2	50	9	13	1
....PLEUROSIGMA	--	-	--	-	*	0	--	-	--	-
...NITZSCHIACEAE										
....NITZSCHIA	390	11	1000	11	430	4	75	13	130	5
...SURIRELLACEAE										
....SURIRELLA	*	0	67	1	--	-	35	6	26	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	40	7	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	*	0	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	*	0	67	1	--	-	--	-	13	1
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	530	6	--	-	--	-	--	-
....ANACYSTIS	230	6	--	-	8200#	74	--	-	140	6
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....LYNGBYA	--	-	--	-	--	-	--	-	--	-
....OSCILLATORIA	--	-	--	-	--	-	--	-	1500#	64
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	26	1	200	2	--	-	5	1	26	1
....TRACHELOMONAS	*	0	--	-	--	-	15	3	26	1

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 25,80	JUL 23,80	AUG 20,80	SEP 17,80
TIME	1000	1130	1030	1130
TOTAL CELLS/ML	6400	7000	1300	7500
DIVERSITY: DIVISION	1.3	1.7	1.4	0.8
.CLASS	1.3	1.7	1.4	0.8
..ORDER	1.9	2.1	2.1	0.8
...FAMILY	2.2	2.8	2.1	0.9
....GENUS	2.3	2.8	3.0	1.0
			0.0	1.7

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	250	4	1800*	26	230*	18	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	*	0	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-
...OOCYSTACEAE	--	-	--	-	150	12	--	-
....ANKISTRODESMUS	50	1	67	1	64	5	*	0
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	50	1	--	-	26	2	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	57	1
....KIRCHNERIELLA	50	1	--	-	--	-	*	0
....OOCYSTIS	--	-	170	2	--	-	--	-
....SELENASTRUM	75	1	67	1	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-
....TREUBARIA	--	-	--	-	--	-	--	-
...SCENEDESMACEAE								
....ACTINASTRUM	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-
....SCENEDESMUS	3500*	56	1200*	17	230*	18	260	3
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	26	2	--	-
....OUROCOCCUS	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	190	3	100	1	52	4	--	-
...VOLVOCACEAE								
....PANDORINA	--	-	--	-	--	-	--	-
..ZYGNEMATALES								
...DESMIDIACEAE								
....CLOSTERIUM	--	-	*	0	--	-	--	-
....COSMARIUM	--	-	--	-	13	1	--	-

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 25,80 1000		JUL 23,80 1130		AUG 20,80 1030		SEP 17,80 1130	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	430	7	1700#	25	130	10	--	-
....MELOSIRA	--	-	--	-	77	6	320	4
....STEPHANODISCUS	*	0	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	*	0
....COCCONEIS	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...EUNOTIACEAE								
....EUNOTIA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	--	-	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	--	-	*	0	--	-	*	0
...GOMPHONEMATACEAE								
....GOMPHONEMA	*	0	--	-	--	-	--	-
...NAVICULACEAE								
....DIPLONEIS	--	-	--	-	--	-	*	0
....MASTOGLOIA	--	-	--	-	--	-	--	-
....NAVICULA	*	0	--	-	13	1	*	0
....PLEUROSIGMA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	390	6	370	5	130	10	420	6
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	*	0
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	--	-	--	-	--	-	--	-
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE								
..HETEROCOCCALES								
...CHLOROTHECIACEAE								
....OPHIOCYTIUM	--	-	--	-	--	-	--	-
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	50	1	--	-	--	-	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	100	1	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	--	-	--	-
....ANACYSTIS	800	13	--	-	100	8	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....LYNGBYA	--	-	--	-	--	-	--	-
....OSCILLATORIA	450	7	800	12	--	-	1200#	16
....SCHIZOTHRIX	--	-	--	-	--	-	5000#	67
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	--	-	430	6	39	3	*	0
....TRACHELOMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM: EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED: LESS THAN 1/2%

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	880	867	876	776	751	765	845	833	842	810	803	806
2	864	633	752	814	755	788	950	776	855	798	784	790
3	665	641	653	783	755	769	1030	857	956	827	780	793
4	724	659	688	787	783	785	1070	999	1010	819	785	794
5	766	700	726	787	780	783	1100	1070	1090	784	776	779
6	745	714	726	806	784	796	1110	1070	1080	1000	773	845
7	749	696	714	800	788	793	1100	969	1070	1030	974	1010
8	707	688	694	796	787	789	1060	990	1050	1090	1020	1070
9	766	710	743	799	784	792	1100	1060	1070	1210	1060	1120
10	769	767	768	779	675	712	1090	1070	1080	1100	1070	1090
11	770	744	765	729	676	699	1070	1050	1060	1840	1040	1320
12	737	697	714	762	728	745	1070	1050	1070	1390	1130	1230
13	733	708	718	771	759	764	1070	1070	1070	1090	974	1040
14	763	736	756	781	770	776	1080	1050	1070	997	947	973
15	771	762	764	781	779	780	1080	1070	1080	945	938	943
16	769	750	762	778	759	768	1090	919	1040	940	933	937
17	783	765	778	764	751	759	1060	1020	1030	940	918	931
18	799	779	790	768	758	761	1150	1080	1100	937	916	927
19	803	779	800	767	755	759	1200	1140	1160	917	901	910
20	805	800	803	757	752	755	1180	1170	1170	899	886	894
21	807	793	802	790	732	771	1160	1160	1160	887	875	879
22	795	782	790	790	603	719	1270	1150	1190	885	875	882
23	779	708	750	658	517	594	1410	1080	1270	873	810	834
24	737	709	729	621	556	586	1130	797	972	886	823	863
25	765	739	755	783	587	616	838	717	779	894	888	891
26	757	747	752	734	584	640	900	759	848	896	893	895
27	761	733	753	682	671	677	959	762	861	901	897	901
28	758	730	746	849	679	812	835	755	795	902	902	902
29	786	758	770	854	746	795	838	825	832	904	900	903
30	784	710	767	829	728	790	833	824	829	905	902	903
31	751	707	732	---	---	---	827	813	819	910	900	906
MONTH	880	633	753	854	517	745	1410	717	1010	1840	773	934

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	938	905	919	1000	978	986	699	665	682	804	796	799
2	956	927	940	993	975	983	666	649	657	805	794	799
3	961	925	938	976	965	957	696	601	672	795	786	790
4	933	893	921	946	891	929	624	388	485	786	774	781
5	911	885	903	891	880	888	923	610	721	782	772	779
6	906	883	894	934	878	898	1290	940	1130	799	783	788
7	917	901	906	1030	942	993	1160	641	756	828	786	809
8	929	919	925	1040	1000	1030	711	659	675	828	817	822
9	938	894	924	1050	951	995	754	673	703	823	809	816
10	909	892	902	2470	965	1430	895	696	802	848	821	836
11	910	904	907	2220	1230	1620	754	716	733	861	833	847
12	912	895	904	1300	1080	1170	735	720	729	836	825	831
13	903	893	896	1080	1000	1030	738	726	731	852	831	846
14	908	898	902	1290	1010	1090	739	575	697	848	837	842
15	910	906	910	2350	1180	1350	937	578	826	841	827	833
16	911	901	908	1920	1060	1370	1150	941	1050	833	819	827
17	913	896	905	1030	453	771	1160	779	1040	831	805	822
18	914	898	906	610	370	494	765	713	725	815	589	668
19	919	909	913	818	347	620	735	725	730	827	694	769
20	927	920	924	648	435	494	745	736	740	691	680	683
21	929	919	925	830	514	632	754	737	746	683	681	682
22	1300	927	1100	965	692	835	770	752	758	683	679	681
23	1240	886	1020	1350	712	992	786	756	777	682	680	681
24	890	788	822	689	582	608	785	773	779	692	682	689
25	795	774	786	1170	587	799	804	785	798	702	689	695
26	828	786	806	599	499	536	804	795	800	697	684	689
27	862	830	844	523	510	516	810	798	801	690	684	687
28	889	862	876	557	526	538	851	800	823	700	691	694
29	1130	870	1020	702	560	662	806	794	798	737	700	712
30	---	---	---	687	656	667	815	797	806	875	731	775
31	---	---	---	705	671	693	---	---	---	879	729	790
MONTH	1300	774	912	2470	347	889	1290	388	772	879	589	767

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	741	728	733	857	836	846	649	621	634	647	515	540
2	743	731	738	848	825	833	738	480	652	567	525	533
3	792	680	715	816	805	810	565	330	428	639	540	579
4	726	683	702	830	810	820	644	588	611	642	610	622
5	733	728	731	880	825	836	710	619	653	611	587	600
6	876	733	770	827	793	814	660	514	562	634	597	612
7	779	742	750	793	768	781	565	519	532	686	623	650
8	737	695	719	790	631	726	646	542	583	695	677	683
9	702	680	687	665	634	652	619	596	613	740	614	686
10	693	685	690	634	617	625	705	581	635	613	593	599
11	708	698	704	630	622	626	630	601	613	617	598	611
12	720	713	716	637	617	623	658	582	599	665	610	633
13	730	727	728	631	624	627	609	591	600	725	667	680
14	747	733	740	634	628	634	636	604	621	632	591	603
15	877	752	773	670	634	644	655	630	642	618	604	609
16	835	765	770	769	654	698	681	641	650	633	617	625
17	780	772	775	723	664	693	722	682	709	694	580	621
18	789	763	766	677	650	660	720	695	709	610	598	602
19	821	742	747	684	654	667	721	716	719	626	615	618
20	871	819	827	720	653	690	750	723	739	635	629	632
21	828	823	826	746	667	722	759	575	683	644	625	637
22	838	833	835	771	731	751	576	426	477	735	651	667
23	847	840	845	752	740	745	492	457	476	715	649	686
24	864	852	859	752	728	740	517	492	499	672	656	668
25	904	869	885	760	723	739	518	504	511	680	673	677
26	917	867	906	766	748	757	581	512	529	691	680	683
27	951	894	918	771	671	707	565	545	552	718	694	706
28	885	786	823	662	299	440	640	556	580	716	710	713
29	835	785	801	544	442	535	662	615	641	717	709	714
30	842	827	835	556	544	549	759	574	666	724	720	722
31	---	---	---	678	551	640	635	572	589	---	---	---
MONTH	951	680	740	880	299	697	759	330	604	740	515	640

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		OCTOBER			NOVEMBER			DECEMBER			JANUARY	
1	19.5	18.5	19.0	11.5	10.0	11.0	2.0	1.5	1.5	2.0	1.5	2.0
2	19.0	18.0	18.5	11.0	9.0	10.0	1.5	.0	1.0	2.0	1.5	1.5
3	18.0	18.0	18.0	9.0	7.5	8.0	1.0	.0	.5	1.5	1.0	1.5
4	17.5	16.5	17.0	7.5	6.0	7.0	1.5	.0	.5	1.0	.0	.5
5	16.5	15.0	15.5	7.0	6.5	7.0	3.5	1.5	2.5	.0	.0	.0
6	15.0	13.0	14.0	8.5	7.0	7.5	3.5	3.5	3.5	.0	.0	.0
7	13.5	12.0	13.0	8.0	6.5	7.5	3.0	2.0	2.5	.0	.0	.0
8	12.0	11.0	11.5	6.5	5.5	6.0	3.0	1.5	2.5	.0	.0	.0
9	12.0	11.5	11.5	5.5	4.5	5.0	1.5	.5	1.0	.0	.0	.0
10	11.5	11.0	11.5	7.5	5.5	6.0	2.0	.5	1.0	.0	.0	.0
11	11.0	9.5	10.0	5.5	4.5	5.0	5.0	2.0	3.5	3.5	.0	1.5
12	11.5	10.0	10.5	4.0	2.5	3.5	6.0	5.0	5.5	1.5	.0	.5
13	10.5	9.0	9.5	4.0	2.0	3.0	5.0	3.0	4.0	.0	.0	.0
14	9.5	8.5	9.0	4.0	3.5	4.0	3.0	1.5	2.0	1.5	.0	1.0
15	11.0	9.0	10.0	4.5	4.0	4.0	1.5	1.0	1.5	1.5	1.0	1.5
16	12.0	11.0	11.5	5.5	4.0	4.5	1.5	.0	1.0	2.0	1.5	2.0
17	13.0	12.0	12.5	5.0	3.5	4.0	.0	.0	.0	3.5	2.0	3.0
18	13.5	13.0	13.5	6.0	4.5	5.0	.0	.0	.0	3.0	2.0	2.5
19	15.0	13.5	14.0	7.0	5.5	6.0	.5	.0	.0	2.0	1.5	1.5
20	16.5	15.0	15.5	8.0	7.0	7.5	1.5	.5	1.0	1.5	.5	1.0
21	17.5	16.5	17.0	8.5	7.0	8.0	2.0	.5	1.5	1.0	.5	.5
22	19.0	17.5	18.0	11.0	8.5	9.5	4.0	2.0	3.0	1.5	.5	1.0
23	18.5	13.5	16.5	11.5	10.0	11.0	4.0	2.5	3.5	1.0	.0	.5
24	13.0	10.0	11.5	10.0	7.5	8.5	6.0	2.5	4.5	.0	.0	.0
25	10.0	8.0	9.0	7.0	6.0	6.5	5.5	4.0	5.0	.0	.0	.0
26	8.0	6.5	7.0	8.5	6.5	8.0	4.0	2.5	3.0	.0	.0	.0
27	7.5	6.0	6.5	7.5	6.5	6.5	2.5	2.0	2.0	.0	.0	.0
28	8.5	7.5	8.0	6.0	4.5	5.5	2.0	1.5	2.0	.0	.0	.0
29	8.5	7.5	8.0	4.5	2.5	3.0	2.5	1.5	2.0	.0	.0	.0
30	8.5	7.5	8.0	2.5	1.5	2.0	2.0	1.5	2.0	.0	.0	.0
31	10.0	8.0	9.0	---	---	---	2.0	2.0	2.0	.0	.0	.0
MONTH	19.5	6.0	12.5	11.5	1.5	6.5	6.0	.0	2.0	3.5	.0	.5

04165500 CLINTON RIVER AT MOUNT CLEMENS, MI--CONTINUED

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		FEBRUARY			MARCH			APRIL			MAY	
1	.0	.0	.0	.0	.0	.0	5.5	5.0	5.0	13.0	11.0	12.0
2	.0	.0	.0	.5	.0	.0	6.5	5.0	5.5	15.5	12.5	14.0
3	.0	.0	.0	.5	.0	.0	6.5	6.0	6.0	17.5	14.5	16.0
4	.0	.0	.0	1.0	.0	.5	5.5	4.5	5.0	18.5	16.5	17.5
5	.0	.0	.0	2.5	1.0	1.5	6.0	4.0	5.0	19.5	18.0	18.5
6	.5	.0	.0	2.5	1.5	2.0	8.0	5.5	6.5	19.0	17.5	18.5
7	.5	.0	.0	2.5	2.0	2.0	8.5	8.0	8.5	18.0	15.0	16.5
8	1.0	.0	.5	2.5	1.0	2.0	9.0	8.5	9.0	14.5	13.0	13.5
9	1.0	.5	1.0	2.5	.5	1.5	9.5	8.5	9.0	13.0	11.5	12.5
10	.5	.0	.0	4.5	2.0	3.0	8.5	6.5	7.5	13.0	11.0	12.5
11	.5	.0	.0	3.5	1.0	1.5	6.5	6.5	6.5	15.5	12.5	14.0
12	1.0	.0	.0	1.5	.0	.5	8.0	6.5	7.0	16.0	14.5	15.5
13	1.0	.0	.5	1.0	.5	1.0	8.5	6.5	7.5	15.5	14.5	15.0
14	1.5	.5	1.0	3.0	1.0	2.0	8.0	5.5	6.5	14.5	13.0	13.5
15	1.5	1.0	1.5	4.0	2.0	3.0	5.5	5.0	5.0	14.0	13.0	13.5
16	1.5	1.0	1.5	3.0	2.0	2.5	6.0	4.5	5.5	15.5	13.0	14.0
17	1.0	.0	.5	2.5	1.0	2.0	7.5	6.0	6.5	15.0	14.0	14.5
18	.0	.0	.0	1.0	.0	.5	10.0	7.0	8.5	14.5	13.5	14.0
19	1.0	.0	.5	2.0	.0	1.0	13.0	9.5	11.0	15.5	14.0	14.5
20	3.5	1.0	2.5	5.5	2.0	3.5	14.5	12.0	13.0	16.5	14.5	15.5
21	4.5	3.5	4.0	5.5	2.0	4.5	14.5	12.5	13.5	18.0	16.0	17.0
22	4.0	2.0	3.5	2.0	.5	1.5	15.5	13.5	14.5	19.5	17.0	18.0
23	2.0	1.5	1.5	2.5	2.0	2.0	15.5	14.0	15.0	20.5	18.5	19.5
24	2.0	1.5	1.5	2.5	2.0	2.5	14.0	11.5	12.5	21.0	19.5	20.0
25	2.0	1.0	1.5	2.5	2.0	2.0	11.5	10.0	11.0	21.5	19.5	20.0
26	1.0	.0	.5	3.0	1.5	2.0	13.0	11.0	12.0	19.5	18.0	18.5
27	.5	.0	.0	5.5	3.0	4.0	12.5	11.5	12.0	18.5	17.0	17.5
28	1.0	.0	.5	6.0	5.5	5.5	12.5	11.0	11.5	20.5	17.5	19.0
29	.0	.0	.0	6.0	5.5	5.5	12.5	12.0	12.0	20.0	18.5	19.0
30	---	---	---	6.5	5.0	5.5	12.0	11.0	11.5	20.5	18.5	19.5
31	---	---	---	6.0	5.5	6.0	---	---	---	21.0	19.0	20.0
MONTH	4.5	.0	1.0	6.5	.0	2.5	15.5	4.0	9.0	21.5	11.0	16.0

DAY	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN	MAX	MIN	MEAN
		JUNE			JULY			AUGUST			SEPTEMBER	
1	20.5	17.5	18.5	21.5	19.5	20.5	25.0	22.5	23.5	23.5	22.5	23.0
2	19.0	16.5	17.5	23.0	21.0	22.0	25.0	22.0	23.0	23.5	22.5	23.0
3	19.0	18.0	18.5	23.0	21.0	22.0	22.0	21.0	21.5	22.5	21.0	22.0
4	19.0	17.5	18.0	23.0	21.5	22.0	23.5	22.0	22.5	22.5	21.5	22.0
5	19.0	17.0	17.5	22.5	21.0	22.0	24.0	22.5	23.5	23.0	22.0	22.5
6	19.5	16.5	18.0	22.0	20.5	21.5	24.0	22.5	22.5	22.5	21.5	22.0
7	19.5	18.0	18.5	22.0	21.0	21.5	24.0	22.5	23.0	22.5	20.5	21.0
8	18.0	16.5	17.5	22.0	20.5	21.5	24.5	23.5	24.0	21.5	19.5	20.5
9	16.5	14.5	15.5	22.0	21.0	21.5	24.5	23.5	24.0	22.0	20.5	21.0
10	14.5	13.0	14.0	22.5	20.0	21.0	24.5	22.5	23.0	20.5	18.5	19.5
11	16.0	13.0	14.5	24.5	22.0	23.0	22.5	22.0	22.5	19.5	18.0	19.0
12	18.0	15.0	16.5	24.5	22.5	23.0	22.5	22.0	22.0	19.5	19.0	19.0
13	19.5	17.5	18.5	22.5	20.5	21.5	22.5	21.5	22.0	20.0	19.0	19.0
14	19.5	18.5	18.5	24.0	21.5	22.5	22.5	21.5	22.0	20.0	19.0	19.5
15	18.5	16.5	17.5	25.5	23.5	24.0	23.0	22.0	22.5	19.0	18.0	18.5
16	17.0	14.5	16.0	25.5	24.0	24.5	22.5	21.0	22.0	18.5	17.5	18.0
17	18.5	15.5	17.0	24.5	23.5	24.0	22.0	20.5	21.5	18.0	17.5	18.0
18	18.5	17.0	18.0	24.5	22.5	23.5	22.5	20.0	21.0	17.5	15.5	16.0
19	18.0	17.0	17.5	25.0	23.0	24.0	22.5	21.5	22.0	17.5	15.5	16.5
20	18.0	16.0	17.0	25.5	24.5	25.0	23.5	22.5	23.0	18.5	17.5	18.0
21	19.5	17.0	18.0	25.5	24.5	25.0	24.0	22.5	23.0	20.5	18.5	19.5
22	21.0	18.0	19.5	25.5	24.0	25.0	22.5	22.0	22.5	20.5	19.5	20.0
23	22.0	19.5	21.0	25.0	23.0	23.5	22.5	21.0	22.0	20.5	18.0	19.5
24	22.0	21.0	21.5	23.5	21.5	22.5	23.0	21.0	22.0	18.0	16.5	17.0
25	23.0	21.0	22.0	23.5	21.5	22.5	23.0	22.0	22.5	16.5	16.0	16.5
26	24.0	22.0	23.0	23.5	22.5	23.0	24.0	22.5	23.0	16.5	15.5	16.0
27	24.5	22.0	23.0	22.5	22.0	22.0	25.0	23.0	24.0	15.0	14.0	14.5
28	23.0	21.0	22.0	22.5	21.0	21.5	25.0	24.0	24.5	15.0	13.5	14.5
29	23.0	22.0	22.5	21.5	20.5	21.0	25.5	24.5	25.0	15.5	13.5	14.5
30	22.5	20.5	21.0	22.0	20.5	21.5	25.5	24.0	24.5	16.5	14.5	15.5
31	---	---	---	23.0	21.0	22.0	24.0	23.5	23.5	---	---	---
MONTH	24.5	13.0	18.5	25.5	19.5	22.5	25.5	20.0	23.0	23.5	13.5	18.5

04165556 CLINTON RIVER BY-PASS BELOW WEIR AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°34'43", long 82°52'34", in NW¼ sec.23, T.2 N., R.13 E., Macomb County, Hydrologic Unit 04090003, on right bank 600 ft downstream from weir, on Wellington Crescent in Mount Clemens.

PERIOD OF RECORD.--December 1979 to September 1980 (gage heights only).

GAGE.--Water-stage recorder. Datum of gage is 570.43 ft (173.867 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded during period December 1979 to September 1980, 6.80 ft (2.073 m) June 7; minimum recorded, 4.64 ft (1.414 m) Jan. 7.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1			---	5.82	5.51	5.29	6.01	6.10	6.06	6.15	---	6.19
2			---	5.75	5.50	5.26	5.96	6.08	6.06	6.13	---	6.13
3			---	5.71	5.52	5.22	5.97	6.07	6.14	6.14	---	6.19
4			---	5.73	5.56	5.18	6.45	6.06	6.13	6.15	---	6.24
5			---	5.70	5.60	5.18	6.51	6.00	6.17	6.11	---	6.13
6			---	5.84	5.60	5.20	6.23	6.03	6.24	6.13	---	6.12
7			---	5.35	5.62	5.20	6.07	5.84	6.25	6.19	---	6.13
8			---	5.50	5.61	5.26	6.07	5.90	6.05	6.19	---	6.14
9			---	5.63	5.59	5.27	6.06	5.91	6.14	6.21	---	6.08
10			---	5.74	5.57	5.17	5.96	5.99	6.13	6.20	---	6.06
11			---	5.62	5.51	5.10	5.98	5.96	6.19	6.16	---	6.02
12			---	5.42	5.47	5.22	5.95	5.97	6.20	6.18	---	6.07
13			---	5.68	5.49	5.43	5.96	6.01	6.20	6.17	---	6.15
14			---	5.68	5.49	5.04	6.24	5.95	6.17	6.18	---	6.03
15			---	5.75	5.48	5.03	6.39	6.01	6.12	6.13	---	6.06
16			---	5.79	5.45	5.07	6.41	6.02	6.20	6.14	---	6.08
17			---	5.73	5.44	5.18	6.41	6.15	6.24	6.12	---	6.03
18			---	5.64	5.46	5.56	6.33	6.29	6.20	6.16	---	6.13
19			5.40	5.59	5.48	5.71	6.26	6.25	6.14	6.15	---	6.06
20			5.40	5.56	5.50	5.55	6.20	6.20	6.08	6.17	6.21	6.03
21			5.41	5.58	5.46	5.40	6.15	6.15	6.20	6.11	6.22	6.00
22			5.38	5.53	5.51	5.91	6.14	6.13	6.22	6.15	6.15	5.99
23			5.40	5.31	5.47	5.99	6.02	6.10	6.20	6.11	6.13	6.01
24			5.57	5.54	5.40	5.93	6.06	6.08	6.19	---	6.18	6.07
25			5.67	5.66	5.33	5.97	6.01	6.02	6.18	---	6.19	6.04
26			6.10	5.70	5.43	6.03	6.04	6.02	6.14	---	6.16	5.79
27			6.09	5.72	5.31	5.97	5.99	6.04	6.16	---	6.13	5.95
28			6.04	5.69	5.38	5.87	6.12	6.04	6.20	---	6.15	5.93
29			6.00	5.63	5.33	5.88	6.11	6.04	6.08	---	6.15	5.95
30			5.96	5.59	---	5.95	6.12	6.05	6.07	---	6.13	5.93
31			5.89	5.54	---	6.05	---	5.95	---	---	6.12	---
MEAN			---	5.64	5.49	5.49	6.14	6.05	6.16	---	---	6.06
MAX			---	5.84	5.62	6.05	6.51	6.29	6.25	---	---	6.24
MIN			---	5.31	5.31	5.03	5.95	5.84	6.05	---	---	5.79

04165557 CLINTON RIVER BY-PASS AT MOUTH AT MOUNT CLEMENS, MI

LOCATION.--Lat 42°33'41", long 82°50'43", in SW¼ sec.30, T.2 N., R.14 E., Macomb County, Hydrologic Unit 04090003, on left bank at mouth, in Mount Clemens.

PERIOD OF RECORD.--October 1979 to September 1980 (gage heights only).

GAGE.--Water-stage recorder. Altitude of gage is 580 ft (177 m), from topographic map.

REMARKS.--Records fair.

EXTREMES FOR CURRENT YEAR.--Maximum gage height recorded, 3.05 ft (0.930 m) Aug. 4; minimum recorded, 1.34 ft (0.408 m) Nov. 1.

GAGE HEIGHT (FEET ABOVE DATUM), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.35	1.67	---	2.36	2.07	1.82	2.51	2.63	2.36	2.62	2.80	2.66
2	2.26	1.91	---	2.31	2.05	1.70	2.47	2.61	2.59	2.68	2.72	2.74
3	2.38	1.96	---	2.26	2.06	1.79	2.69	2.58	2.65	2.67	2.93	2.71
4	2.37	1.93	---	2.18	2.11	1.96	2.71	2.55	2.67	2.64	2.80	2.46
5	2.35	1.73	---	2.26	2.14	1.62	2.68	2.56	---	2.61	2.81	2.75
6	2.23	1.85	---	2.39	2.15	1.61	2.52	2.35	---	2.62	2.94	2.70
7	2.16	1.92	---	1.93	2.16	1.63	---	2.42	---	2.58	2.88	2.66
8	2.18	1.78	---	2.03	2.15	1.63	---	2.48	---	2.62	2.87	2.67
9	2.27	1.85	---	2.18	2.13	---	---	2.48	---	2.68	2.87	2.59
10	2.26	2.01	---	2.29	2.11	---	---	2.26	---	2.71	2.55	2.70
11	2.16	1.95	---	2.14	2.05	---	---	2.24	---	2.70	2.78	2.63
12	2.21	2.02	---	1.96	2.00	---	---	2.53	---	2.63	2.85	2.57
13	2.05	1.96	---	2.22	2.03	---	---	2.38	---	2.65	2.79	2.07
14	2.17	---	---	2.24	2.03	---	---	2.50	---	2.63	2.76	2.62
15	2.20	---	---	2.30	2.02	---	---	2.54	---	2.60	2.80	2.67
16	2.23	---	---	2.34	2.00	---	---	2.45	---	2.69	2.79	2.51
17	2.22	---	---	2.28	2.02	---	---	2.09	---	2.67	2.10	2.58
18	2.25	---	2.00	2.19	2.02	---	---	2.57	---	2.64	2.64	2.34
19	2.21	---	1.95	2.16	2.04	---	---	2.73	---	2.57	2.75	2.55
20	2.22	---	1.96	2.13	2.00	---	---	2.72	---	2.51	2.72	2.52
21	2.22	---	1.95	2.14	1.94	---	---	2.69	---	2.64	2.63	2.52
22	2.20	---	1.92	2.10	1.91	---	2.14	2.67	---	2.68	2.72	2.51
23	2.07	---	1.93	1.90	2.02	---	2.36	2.64	---	2.71	2.73	2.60
24	1.82	---	1.99	2.10	1.81	---	2.37	2.60	---	2.64	2.71	2.57
25	1.93	---	2.03	2.22	---	---	2.56	2.56	2.65	2.66	2.72	2.35
26	2.01	---	2.46	2.26	---	2.52	2.58	2.53	2.65	2.69	2.68	2.46
27	1.75	---	2.55	2.28	1.89	2.45	2.52	2.57	2.70	2.50	2.70	2.53
28	1.92	---	2.56	2.25	1.96	2.39	2.40	2.53	2.56	2.77	2.62	2.52
29	2.03	---	2.55	2.19	1.85	2.38	2.64	2.38	2.56	2.86	2.41	2.35
30	1.64	---	2.50	2.15	---	2.22	2.65	2.37	2.64	2.85	2.56	2.43
31	1.63	---	2.46	2.10	---	2.37	---	2.43	---	2.41	2.59	---
MEAN	2.13	---	---	2.19	---	---	---	2.50	---	2.65	2.72	2.55
MAX	2.38	---	---	2.39	---	---	---	2.73	---	2.86	2.94	2.75
MIN	1.63	---	---	1.90	---	---	---	2.09	---	2.41	2.10	2.07

04165700 DETROIT RIVER AT DETROIT, MI
(National stream-quality accounting network station)

LOCATION.--Lat 42°20'50", long 82°57'31", in T.2 S., R.13 E., Wayne County, Hydrologic Unit 04090004, at Detroit municipal water treatment facility at Water Works Park at Detroit.

DRAINAGE AREA.--228,800 mi² (592,600 km²), approximately.

PERIOD OF RECORD.--Water years 1970 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: February 1974 to current year.
WATER TEMPERATURES: October 1973 to current year.

REMARKS.--During the winter months a surface sample is collected near the municipal water intake. The intake is in a lagoon at north end of Belle Isle in the Detroit River. During summer months depth-integrated samples are collected by boat along river cross section at north end of Belle Isle. Daily temperature values are the mean of three measurements. Daily mean water discharges are reported for sampling times. Biological Data (Phytoplankton) is for the 1979-80 water year.

COOPERATION.--Daily mean temperature and specific conductance records are collected by Detroit municipal treatment facility employees. Water discharges were furnished by the National Oceanic and Atmospheric Administration.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 383 micromhos Apr. 8, 1979; minimum daily, 194 micromhos July 24, 1976.
WATER TEMPERATURES: Maximum daily, 24.5°C July 21, 1977, Aug. 29-31, 1980; minimum daily, 0.5°C on many days during winter periods.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 250 micromhos Apr. 9; minimum daily, 197 micromhos Oct. 19, 31.
WATER TEMPERATURES: Maximum daily, 24.5°C Aug. 29-31; minimum daily, 0.0°C Jan. 8.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT												
16...	1215	213000	218	8.1	10.5	10.4	94	K7	K1	100	18	29
NOV												
20...	0945	214000	202	8.0	6.5	12.1	98	K17	K1	92	12	25
DEC												
17...	1130	226000	212	7.5	.0	14.4	115	K2	<1	89	10	25
JAN												
22...	1030	216000	205	7.6	.5	13.5	96	<1	K1	96	19	27
FEB												
26...	1030	213000	210	7.8	.0	12.6	86	<1	K1	97	18	27
MAR												
25...	1100	226000	220	7.6	1.0	16.6	118	K2	46	96	14	27
APR												
23...	1200	209000	224	8.0	8.0	12.5	113	K2	21	100	18	28
JUN												
03...	1130	212000	220	7.9	15.0	10.2	102	--	--	93	17	26
24...	1100	209000	218	8.0	18.0	9.0	96	K2	K2	97	19	27
JUL												
22...	1400	216000	219	8.0	22.5	8.8	101	E33	K1	99	17	28
AUG												
19...	1200	209000	228	8.4	22.0	8.3	95	--	E12	99	0	28
SEP												
16...	1415	205000	320	7.7	19.5	8.5	94	K1	K1	100	24	29

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT											
16...	7.4	0	4.7	.2	12	.8	100	0	82	1.3	17
NOV											
20...	7.3	0	3.6	.2	8	.8	98	0	80	1.6	16
DEC											
17...	6.5	--	3.9	.2	12	.9	96	0	79	4.9	15
JAN											
22...	7.0	0	4.3	.2	9	.9	94	0	77	3.8	17
FEB											
26...	7.2	0	3.8	.2	8	.8	96	0	79	2.4	16
MAR											
25...	6.9	--	4.8	.2	10	1.1	100	0	82	4.0	15
APR											
23...	7.4	0	5.1	.2	10	1.0	100	0	82	1.6	17
JUN											
03...	6.9	0	4.6	.2	10	.8	100	0	82	1.9	17
24...	7.1	--	4.5	.2	9	.9	110	0	90	1.5	17
JUL											
22...	7.0	0	4.1	.2	8	.9	100	0	82	1.6	14
AUG											
19...	7.0	0	5.8	.3	11	.9	100	20	115	.6	17
SEP											
16...	7.6	--	4.7	.2	9	.9	100	0	80	3.1	17

04165710 DETROIT RIVER AT DETROIT, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
16...	7.2	.1	1.1	115	118	66100	.26	.26	.000	.000	.00
NOV											
20...	6.3	.1	1.0	116	109	67000	.24	.24	.010	.010	.01
DEC											
17...	6.2	.1	1.3	112	108	68300	.27	.29	.040	.000	.05
JAN											
22...	6.8	.1	1.3	128	110	74700	.22	.20	.060	.030	.07
FEB											
26...	6.1	.1	1.3	113	111	65000	.23	.22	.120	.030	.21
MAR											
25...	8.2	.1	1.4	127	109	77500	.37	.37	.060	.060	.08
APR											
23...	8.5	.1	1.3	138	120	77900	.55	.51	.020	.020	.03
JUN											
03...	7.5	.1	.6	142	111	81300	.35	.32	.020	.000	.02
24...	7.8	.1	1.1	125	114	70500	.37	.36	.010	.000	.01
JUL											
22...	6.9	.1	.8	130	113	75800	.29	.30	.010	.010	.01
AUG											
19...	8.0	.2	.5	123	138	69400	.31	.29	.040	.040	.05
SEP											
16...	8.6	.1	1.6	133	119	73600	.57	.37	.030	.080	.04

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDI-MENT, SUS-PENDED (MG/L)	SEDI-MENT DIS-CHARGE, SUS-PENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
16...	.44	.44	.56	2.5	.010	.03	.010	--	11	6330	100
NOV											
20...	.25	.26	.50	2.2	.000	.00	.000	3.1	--	--	--
DEC											
17...	.38	.42	.69	3.1	.010	.03	.010	2.2	--	--	--
JAN											
22...	.03	.09	.31	1.4	.010	.03	.000	--	--	--	--
FEB											
26...	.00	.12	.35	1.6	.010	.03	.010	1.4	--	--	--
MAR											
25...	.27	.33	.70	3.1	.030	.09	.000	8.3	--	--	--
APR											
23...	.50	.52	1.1	4.7	.020	.06	.010	--	23	13000	100
JUN											
03...	.02	.04	.39	1.7	.020	.06	.010	2.9	16	9160	100
24...	.17	.18	.55	2.4	.010	.03	.000	2.5	8	4510	100
JUL											
22...	.18	.19	.48	2.1	.020	.06	.010	--	11	6420	100
AUG											
19...	.17	.21	.52	2.3	.050	.15	.020	.9	10	5640	100
SEP											
16...	.09	.12	.69	3.1	.000	.00	.000	1.6	10	5540	100

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, TOTAL RECOV-ERABLE (UG/L AS BA)	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM TOTAL RECOV-ERABLE (UG/L AS CD)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, TOTAL RECOV-ERABLE (UG/L AS CR)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, TOTAL RECOV-ERABLE (UG/L AS CO)
OCT 16...	1215	3	2	--	60	--	0	20	20	--
JAN 22...	1030	4	1	<50	30	0	1	<10	<10	0
APR 23...	1200	5	4	<50	30	0	0	20	10	0
JUL 22...	1400	1	0	50	30	4	4	10	10	0

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY TOTAL RECOV-ERABLE (UG/L AS HG)
OCT 16...	2	--	2	330	10	--	0	10	0	.4
JAN 22...	0	4	2	70	0	1	0	10	1	.2
APR 23...	0	9	3	550	10	8	1	20	2	.1
JUL 22...	0	29	2	380	50	4	0	10	1	--

DATE	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, TOTAL RECOV-ERABLE (UG/L AS NI)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, TOTAL (UG/L AS SE)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, TOTAL RECOV-ERABLE (UG/L AS ZN)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CARBON, ORGANIC SUS-PENDED (MG/L AS C)
OCT 16...	.2	--	2	0	0	0	2	2	2.3	.2
JAN 22...	.1	8	1	0	0	0	200	20	2.0	.2
APR 23...	.1	8	0	--	0	0	20	10	8.3	.3
JUL 22...	--	1	0	0	0	0	--	40	2.4	.2

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

PERIPHYTON

DATE	TIME	LENGTH OF EXPO-SURE (DAYS)	BIOMASS CHLORO-PHYLL RATIO PERI-PHYTON (UNITS)	PERI-PHYTON BIOMASS ASH WEIGHT G/SQ M	PERI-PHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)	CHLOR-B PERI-PHYTON CHROMO-GRAPHIC FLUOROM (MG/M2)
NOV 20...	0945	35	170	.470	.550	.470	.000
JUN 03...	1130	41	715	.709	.945	.330	.030

STREAMS TRIBUTARY TO DETROIT RIVER

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 7,78		MAR 14,79		MAY 23,79		JUN 19,79		JUL 18,79	
TIME	1745		1030		1215		1230		1330	
TOTAL CELLS/ML	300		420		790		1100		1700	
DIVERSITY: DIVISION	1.3		1.7		0.8		0.4		1.5	
.CLASS	1.6		1.9		0.8		0.4		1.5	
..ORDER	1.8		2.5		1.6		0.8		1.9	
...FAMILY	1.8		3.1		2.6		1.5		2.4	
....GENUS	1.9		3.2		3.1		1.6		2.8	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	14	3	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	43	10	52	7	--	-	--	-
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	14	5	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	--	-	--	-	--	-	--	-	28	2
....OOCYSTIS	--	-	14	3	--	-	--	-	110	7
....SELENASTRUM	14	5	--	-	13	2	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	--	-	29	7	52	7	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	14	5	--	-	--	-	--	-	28	2
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	29	7	13	2	--	-	--	-
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	14	5	14	3	--	-	65	6	97	6
....MELOSIRA	--	-	--	-	78	10	--	-	--	-
....SKELETONEMA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	100	13	26	2	28	2
....THALASSIOSIRA	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	--	-	14	1
...DIATOMACEAE										
....DIATOMA	--	-	--	-	91	11	--	-	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	160#	20	78	7	140	8
....FRAGILARIA	14	5	--	-	39	5	--	-	630#	37
....SYNEDRA	--	-	58	14	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	13	1	42	2
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	170#	21	65	6	110	7
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	58	14	--	-	750#	71	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	43	14	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	14	1
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	14	3	--	-	--	-	--	-

STREAMS TRIBUTARY TO DETROIT RIVER

04165780 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 7,78 1745		MAR 14,79 1030		MAY 23,79 1215		JUN 19,79 1230		JUL 18,79 1330	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	13	1	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	26	3	--	-	42	2
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	--	-	--	-	--	-	--	-	--	-
....ANACYSTIS	--	-	120#	28	--	-	52	5	--	-
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENOPSIS	190#	62	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	380#	22
....SCHIZOTHRIX	--	-	--	-	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	14	3	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUTREPTIA	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	14	3	--	-	--	-	28	2

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 14,79	SEP 12,79	NOV 20,79	MAR 25,80	JUN 3,80
TIME	1130	1200	0945	1100	1130
TOTAL CELLS/ML	2800	630	64000	3200	2100
DIVERSITY: DIVISION	1.1	1.3	0.1	1.2	1.3
.CLASS	1.1	1.4	0.1	1.2	1.3
..ORDER	1.7	2.2	0.1	1.5	2.0
...FAMILY	1.9	2.4	0.1	2.4	2.7
....GENUS	2.2	2.7	0.1	2.6	3.1

ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	*	0	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	52	2	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....MICRACTINIUM	--	-	--	-	--	-	--	-	--	-
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	15	2	*	0	49	2	64	3
....CHLORELLA	--	-	70	11	--	-	--	-	26	1
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	39	1	--	-	--	-	--	-	77	4
....OOCYSTIS	100	4	--	-	*	0	--	-	--	-
....SELENASTRUM	26	1	--	-	--	-	--	-	26	1
....TETRAEDRON	--	-	--	-	--	-	--	-	--	-
...SCENEDESMACEAE										
....ACTINASTRUM	--	-	--	-	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	--	-	--	-
....SCENEDESMUS	100	4	20	3	*	0	49	2	310	15
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	*	0	73	2	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE										
....CHLAMYDOMONAS	--	-	--	-	--	-	--	-	13	1
..ZYGNEMATALES										
...DESMIDIACEAE										
....STAURASTRUM	--	-	--	-	*	0	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	210	7	20	3	*	0	170	5	100	5
....MELOSIRA	--	-	--	-	--	-	--	-	510#	25
....SKELETONEMA	--	-	30	5	--	-	--	-	--	-
....STEPHANODISCUS	26	1	--	-	--	-	--	-	--	-
....THALASSIOSIRA	--	-	10	2	*	0	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	*	0	--	-
...CYMBELLACEAE										
....CYMBELLA	--	-	--	-	--	-	*	0	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	200	6	--	-
...FRAGILARIACEAE										
....ASTERIONELLA	--	-	--	-	*	0	--	-	--	-
....FRAGILARIA	--	-	5	1	*	0	570#	18	210	10
....SYNEDRA	--	-	5	1	*	0	280	9	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	--	-	13	1
...NITZSCHIACEAE										
....NITZSCHIA	77	3	20	3	--	-	540#	17	90	4
...SURIRELLACEAE										
....SURIRELLA	*	0	--	-	--	-	--	-	--	-
...TABELLARIACEAE										
....TABELLARIA	--	-	15	2	--	-	37	1	350#	17
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...MALLOMONADACEAE										
....MALLOMONAS	--	-	--	-	--	-	--	-	--	-
...OCHROMONADACEAE										
....DINOBRYON	--	-	15	2	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE										
..HETEROCOCCALES										
...CHLOROTHECIACEAE										
....OPHIOCYTIUM	--	-	--	-	--	-	--	-	--	-

04165780 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 14,79 1130		SEP 12,79 1200		NOV 20,79 0945		MAR 25,80 1100		JUN 3,80 1130	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE										
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	*	0	--	-	--	-	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	*	0	--	-	--	-	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....AGMENELLUM	260	9	--	-	--	-	--	-	--	-
....ANACYSTIS	120	4	250#	40	64000#	99	1200#	38	13	1
....COCCOCHLORIS	--	-	--	-	--	-	--	-	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENOPSIS	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	1700#	62	--	-	--	-	--	-	260	13
....SCHIZOTHRIX	--	-	150#	24	--	-	--	-	--	-
...RIVULARIACEAE										
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUTREPTIA	--	-	--	-	*	0	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-	--	-

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 24,80	JUL 22,80	AUG 19,80	SEP 16,80
TIME	1100	1400	1200	1415
TOTAL CELLS/ML	1000	370	5900	6800
DIVERSITY: DIVISION	1.7	1.0	0.6	1.0
.CLASS	1.7	1.0	0.6	1.0
..ORDER	2.0	1.6	1.2	1.9
...FAMILY	2.6	1.6	1.5	2.0
....GENUS	2.8	1.6	1.8	2.3

ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	--	-	--	-	--	-
...MICRACTINIACEAE								
....MICRACTINIUM	--	-	--	-	--	-	51	1
...OOCYSTACEAE								
....ANKISTRODESMUS	13	1	--	-	64	1	64	1
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	13	1	--	-	*	0	--	-
....DICTYOSPHAERIUM	--	-	--	-	39	1	*	0
....KIRCHNERIELLA	--	-	--	-	--	-	--	-
....OOCYSTIS	13	1	51	14	51	1	51	1
....SELENASTRUM	--	-	--	-	--	-	--	-
....TETRAEDRON	--	-	--	-	--	-	90	1
...SCENEDESMACEAE								
....ACTINASTRUM	51	5	--	-	--	-	--	-
....CRUCIGENIA	--	-	--	-	--	-	210	3
....SCENEDESMUS	77	7	--	-	100	2	150	2
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	26	2	--	-	--	-	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE								
....CHLAMYDOMONAS	26	2	13	3	--	-	77	1
..ZYGNEMATALES								
...DESMIDIACEAE								
....STAURASTRUM	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	26	2	26	7	130	2	150	2
....MELOSIRA	--	-	--	-	--	-	220	3
....SKELETONEMA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	*	0	--	-
....THALASSIOSIRA	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	13	1	--	-	--	-	--	-
....COCCONEIS	--	-	--	-	--	-	--	-
...CYMBELLACEAE								
....CYMBELLA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....ASTERIONELLA	77	7	--	-	--	-	--	-
....FRAGILARIA	--	-	--	-	--	-	--	-
....SYNEDRA	13	1	--	-	*	0	*	0
...NAVICULACEAE								
....NAVICULA	--	-	--	-	--	-	--	-
...NITZSCHIACEAE								
....NITZSCHIA	39	4	--	-	*	0	180	3
...SURIRELLACEAE								
....SURIRELLA	--	-	--	-	--	-	--	-
...TABELLARIACEAE								
....TABELLARIA	1900	19	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...MALLOMONADACEAE								
....MALLOMONAS	--	-	--	-	--	-	*	0
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-
....OCHROMONAS	--	-	--	-	--	-	--	-
.XANTHOPHYCEAE								
..HETEROCOCCALES								
...CHLOROTHECIACEAE								
....OPHIOCYTIUM	--	-	--	-	--	-	--	-

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	JUN 24,80 1100		JUL 22,80 1400		AUG 19,80 1200		SEP 16,80 1415	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE								
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	26	2	--	-	64	1	*	0
...CRYPTOMONADACEAE								
....CRYPTOMONAS	--	-	--	-	--	-	51	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....AGMENELLUM	--	-	--	-	210	4	51	1
....ANACYSTIS	440#	42	51	14	600	10	3400#	51
....COCCOCHLORIS	--	-	--	-	51	1	*	0
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENOPSIS	--	-	--	-	370	6	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	230#	62	4100#	70	1900#	28
....SCHIZOTHRIX	--	-	--	-	--	-	--	-
...RIVULARIACEAE								
....RAPHIDIOPSIS	--	-	--	-	--	-	--	-
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUTREPTIA	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	--	-

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04165700 DETROIT RIVER AT DETROIT, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	212	207	217	218	216	218	224	219	228	220	214	215
2	214	202	216	215	218	217	230	209	214	219	220	212
3	210	209	210	206	213	220	229	210	203	218	209	212
4	221	202	213	218	214	219	202	214	210	217	219	210
5	210	207	224	217	210	217	220	210	218	219	217	210
6	211	202	221	214	215	222	220	230	219	220	209	220
7	210	204	222	218	220	218	210	208	220	219	214	204
8	210	202	223	218	217	208	210	210	223	228	217	227
9	215	202	220	218	208	220	250	220	219	218	209	230
10	211	207	220	200	200	220	240	209	219	220	220	227
11	218	212	218	218	200	220	220	220	217	223	222	219
12	216	217	216	218	229	220	219	228	219	219	217	223
13	218	212	215	200	208	208	220	228	219	220	217	221
14	213	215	212	224	208	204	212	230	222	226	209	222
15	223	213	210	208	206	208	222	228	228	230	218	222
16	212	210	208	208	204	208	235	218	218	217	210	226
17	217	210	208	220	208	212	217	220	219	214	212	222
18	212	210	208	206	206	210	214	226	223	219	211	215
19	197	210	204	208	206	212	216	225	209	218	211	215
20	210	210	210	200	226	213	226	219	220	216	209	229
21	210	214	210	210	216	207	210	226	210	219	215	222
22	211	212	208	208	213	210	215	210	219	216	214	215
23	210	210	205	200	226	212	209	228	219	214	213	215
24	206	210	208	206	213	210	212	231	220	218	210	227
25	210	214	209	208	214	210	224	230	226	215	209	213
26	207	225	208	211	216	210	210	223	220	218	212	231
27	202	220	210	206	206	228	212	223	217	219	213	232
28	202	215	219	208	210	225	214	223	224	227	212	222
29	202	220	217	210	218	227	219	223	220	226	230	232
30	200	220	217	201	---	227	219	214	211	230	202	232
31	197	---	226	211	---	229	---	207	---	216	220	---
MEAN	210	211	214	211	213	216	219	220	219	220	214	221

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	18.5	10.0	5.0	3.0	.5	.5	3.5	9.0	16.0	18.5	22.0	24.0
2	18.5	10.0	4.0	2.0	.5	.5	3.5	9.0	15.0	18.5	23.0	24.0
3	18.5	10.0	3.5	2.0	.5	.5	3.5	9.5	15.5	19.0	22.0	23.5
4	18.5	10.0	3.0	1.5	.5	.5	3.5	10.0	16.5	20.0	23.0	23.5
5	18.0	9.5	2.0	1.0	.5	.5	3.5	11.0	16.5	20.0	23.5	23.0
6	16.5	9.5	3.0	.5	.5	.5	4.0	11.5	16.5	20.0	23.5	23.0
7	15.5	9.0	3.5	.5	.5	.5	3.5	11.5	16.5	20.0	23.5	22.0
8	14.5	8.5	3.5	.0	.5	.5	4.0	10.5	16.5	20.5	23.5	22.0
9	14.0	8.0	3.5	.5	.5	.5	5.0	10.5	15.5	20.5	24.0	22.0
10	13.5	8.0	3.5	.5	.5	.5	5.5	10.5	15.0	20.5	24.0	21.0
11	12.0	7.0	4.0	.5	.5	.5	5.0	10.5	14.0	21.5	23.5	20.5
12	12.0	6.5	4.0	.5	.5	.5	4.5	11.0	14.5	22.0	23.0	20.0
13	11.5	6.5	4.0	.5	.5	.5	4.5	11.5	15.0	21.0	23.0	20.0
14	11.0	6.5	4.0	.5	.5	.5	5.0	11.5	15.0	21.0	23.0	20.0
15	11.0	6.5	4.0	.5	.5	.5	5.0	11.0	15.0	21.5	23.0	19.5
16	10.5	6.0	3.5	.5	.5	.5	5.0	11.0	14.5	22.0	22.0	19.5
17	10.5	6.0	3.0	.5	.5	.5	4.5	11.0	15.0	22.0	21.5	19.0
18	11.0	6.5	1.5	.5	.5	.5	5.0	11.5	15.5	22.0	21.5	18.5
19	12.0	6.5	1.0	.5	.5	.5	5.0	12.0	15.5	22.0	21.5	18.5
20	13.0	7.0	1.0	.5	.5	1.0	6.0	12.0	15.5	23.0	21.5	18.5
21	14.0	7.0	1.0	.5	.5	1.5	6.0	14.0	15.5	23.5	22.0	18.5
22	14.5	7.0	.5	.5	.5	.5	7.0	14.0	15.5	23.0	22.0	19.0
23	15.0	8.0	1.5	.5	.5	.5	8.0	14.5	16.5	23.0	22.0	19.0
24	13.5	8.5	3.0	.5	.5	1.0	8.5	15.0	18.0	23.0	23.0	18.5
25	12.0	8.5	3.5	.5	.5	1.5	8.0	15.5	18.5	23.5	23.5	18.5
26	11.0	8.5	3.5	.5	.5	1.5	8.0	15.0	19.0	23.5	23.5	18.0
27	10.0	8.0	4.0	.5	.5	2.0	8.0	15.0	19.0	23.5	23.5	16.5
28	10.0	8.0	3.5	.5	.5	3.0	8.0	15.5	19.0	23.0	24.0	16.0
29	9.0	6.5	3.5	.5	.5	3.0	8.0	16.0	19.5	23.0	24.5	16.0
30	9.0	5.5	3.0	.5	---	3.5	8.0	16.0	19.5	23.0	24.5	16.0
31	9.5	---	3.5	.5	---	3.5	---	16.0	---	22.0	24.5	---
MEAN	13.0	8.0	3.0	.5	.5	1.0	5.5	12.5	16.5	21.5	23.0	20.0

04166000 RIVER ROUGE AT BIRMINGHAM, MI

LOCATION.--Lat 42°32'45", long 83°13'25", in NW¼ sec.36, T.2 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on left bank 25 ft (8 m) downstream from mouth of Quarton Lake outlet, and 100 ft (30 m) upstream from bridge on Maple Road, in Birmingham.

DRAINAGE AREA.--33.3 mi² (86.2 km²). Prior to water year 1971, drainage area was 36.9 mi² (95.6 km²). An area of 3.6 mi² (9.3 km²) noncontributing since then.

PERIOD OF RECORD.--June 1950 to current year.

REVISED RECORDS.--WSP 1387: 1951-52(M). WSP 1557: Drainage area.

GAGE.--Water-stage recorder. Concrete control since July 27, 1962. Datum of gage is 715.94 ft (218.219 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Quarton Lake above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--20 years (water years 1951-70), 15.3 ft³/s (0.433 m³/s), 5.63 in/yr (143 mm/yr); 10 years (water years 1971-80), 22.2 ft³/s (0.629 m³/s), 9.05 in/yr (230 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,390 ft³/s (39.4 m³/s) June 26, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.10 ft³/s (0.003 m³/s) Aug. 8, 9, 1963; minimum gage height, 1.02 ft (0.311 m) Oct. 12, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 180 ft³/s (5.10 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1200	241	6.83	3.29	1.003	Apr. 14	1700	340	9.63	3.76	1.146
Mar. 17	1500	*413	11.7	*4.11	1.253	May 18	0500	218	6.17	3.18	0.969
Apr. 4	0300	390	11.0	4.00	1.219						

Minimum discharge, 3.0 ft³/s (0.085 m³/s) Oct. 1, gage height, 1.57 ft (0.479 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	4.1	9.3	14	21	9.6	11	41	37	28	8.5	8.0	46
2	20	9.3	12	20	9.3	11	35	33	20	7.8	23	29
3	8.9	6.7	11	19	9.2	11	51	30	92	7.0	54	18
4	6.4	6.0	11	17	9.4	11	239	26	30	7.3	18	13
5	6.0	5.6	14	17	9.2	12	78	25	21	13	50	10
6	8.9	6.4	17	15	9.5	12	49	25	70	11	45	9.4
7	9.3	6.5	16	15	9.8	11	41	22	62	7.2	20	8.5
8	7.1	6.1	15	14	9.9	12	58	21	56	42	14	8.1
9	6.7	9.0	13	13	10	12	77	21	32	15	11	24
10	6.6	13	12	13	10	18	66	21	27	11	12	17
11	6.7	8.3	12	40	10	20	46	23	23	7.8	21	11
12	8.9	6.4	14	29	10	13	47	20	21	8.8	31	9.3
13	7.1	6.0	13	18	10	13	40	26	14	9.4	13	26
14	6.0	6.0	11	18	11	14	167	24	21	7.1	11	24
15	5.6	8.3	10	19	12	18	159	18	32	6.4	9.7	14
16	5.6	9.2	10	16	12	40	77	16	32	11	8.6	12
17	5.6	7.8	9.8	22	10	302	51	34	21	11	12	61
18	5.3	6.6	9.1	21	10	99	45	150	17	7.8	13	29
19	5.6	6.4	9.4	19	10	45	39	53	25	6.0	9.2	18
20	5.6	6.1	9.5	16	11	37	36	36	29	5.6	15	14
21	5.3	6.8	9.5	15	13	115	32	28	17	5.1	35	13
22	5.3	28	22	15	54	63	30	24	14	5.2	23	34
23	6.7	51	25	15	31	47	29	19	12	5.3	13	71
24	6.4	64	89	14	20	55	29	21	11	4.6	9.5	26
25	6.0	28	174	13	16	58	29	18	11	4.5	8.4	20
26	5.6	84	71	12	14	39	29	16	8	5.4	7.0	16
27	6.0	30	40	11	14	34	26	15	46	17	6.4	14
28	6.0	42	28	11	15	32	45	14	16	43	6.3	13
29	6.0	27	24	11	12	44	41	14	11	22	6.8	12
30	5.6	18	22	10	---	37	46	14	9.2	12	71	11
31	5.6	---	23	10	---	49	---	35	---	8.8	36	---
TOTAL	210.3	527.8	770.3	517	390.9	1295	1770	879	826.2	343.6	620.9	631.3
MEAN	6.78	17.6	24.8	16.7	13.5	41.8	59.0	28.4	27.5	11.1	20.0	21.0
MAX	20	84	174	40	54	302	239	150	92	43	71	71
MIN	4.1	5.6	9.1	10	9.2	11	26	14	9.2	4.5	6.3	8.1
CFSM	.20	.53	.75	.50	.41	1.26	1.77	.85	.83	.33	.60	.63
IN.	.23	.59	.86	.58	.44	1.45	1.98	.98	.92	.38	.69	.71

CAL YR 1979 TOTAL 7368.3 MEAN 20.2 MAX 310 MIN 3.4 CFSM .61 IN 8.23
WTR YR 1980 TOTAL 8782.3 MEAN 24.0 MAX 302 MIN 4.1 CFSM .72 IN 9.81

04166100 RIVER ROUGE AT SOUTHFIELD, MI

LOCATION.--Lat 42°26'52", long 83°17'52", in SW¼ sec.32, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank at downstream side of bridge on Beech Road at Southfield, 4.2 mi (6.8 km) east of Farmington.

DRAINAGE AREA.--87.9 mi² (227.7 km²).

PERIOD OF RECORD.--April 1958 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 609.62 ft (185.812 m) city of Southfield datum. Prior to Sept. 30, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 58.4 ft³/s (1.654 m³/s), 9.02 in/yr (229 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,900 ft³/s (139 m³/s) June 26, 1968, gage height, 19.04 ft (5.803 m); minimum, 0.1 ft³/s (0.003 m³/s) Aug. 2, 1964, gage height, 1.15 ft (0.351 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1800	765	21.7	9.32	2.841
Mar. 17	2300	1050	29.7	10.44	3.182
Mar. 21	2100	676	19.1	8.88	2.707
Apr. 4	1100	*1140	32.3	*10.74	3.274
Apr. 15	0300	1050	29.7	10.43	3.179
May 18	1200	790	22.4	9.42	2.871
June 3	1600	541	15.3	8.17	2.490
June 6	1300	519	14.7	8.05	2.454

Minimum discharge, 10 ft³/s (0.28 m³/s) Oct. 1, gage height, 2.59 ft (0.789 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	11	26	47	58	27	35	141	89	69	22	22	187
2	35	31	43	54	27	34	109	76	59	20	70	103
3	28	20	41	50	27	34	104	69	332	18	267	64
4	17	17	39	45	27	34	814	63	111	18	68	45
5	15	16	40	45	27	34	308	58	66	42	66	36
6	20	16	54	44	27	34	156	52	322	35	128	31
7	32	20	47	43	28	34	118	49	174	23	50	28
8	18	19	51	39	28	35	122	45	233	50	36	26
9	18	23	39	35	28	37	290	44	104	45	33	88
10	16	48	37	35	28	53	237	44	88	28	62	63
11	16	28	35	102	28	80	145	52	67	23	44	37
12	28	21	40	119	28	43	142	48	58	34	111	32
13	23	19	38	73	28	40	118	68	50	34	45	106
14	18	18	33	55	30	44	273	63	49	22	40	127
15	16	23	31	50	32	51	734	49	94	19	31	57
16	16	34	29	46	32	100	275	42	113	38	25	45
17	15	23	28	58	30	647	153	64	60	36	24	171
18	15	20	28	58	29	565	121	592	49	23	34	108
19	15	18	27	51	29	145	102	166	53	20	27	61
20	15	18	27	44	31	109	90	99	87	17	59	48
21	15	19	28	41	38	434	80	75	49	16	63	43
22	16	84	72	40	150	273	75	62	39	15	99	46
23	29	172	100	36	90	153	70	54	34	14	43	194
24	18	266	280	36	60	164	64	56	30	13	31	77
25	16	97	651	35	50	233	67	49	30	12	26	58
26	15	302	310	32	45	122	65	40	27	14	24	54
27	14	108	135	30	45	101	62	35	61	48	22	43
28	16	157	93	30	41	95	130	34	42	88	20	39
29	15	101	76	29	38	136	102	32	28	61	23	36
30	16	63	67	27	---	118	133	36	24	33	167	34
31	17	---	62	27	---	180	---	108	---	25	82	---
TOTAL	574	1827	2628	1467	1128	4197	5400	2413	2602	906	1842	2087
MEAN	18.5	60.9	84.8	47.3	38.9	135	180	77.8	86.7	29.2	59.4	69.6
MAX	35	302	651	119	150	647	814	592	332	88	267	194
MIN	11	16	27	27	27	34	62	32	24	12	20	26
CFSM	.21	.69	.97	.54	.44	1.54	2.05	.89	.99	.33	.68	.79
IN.	.24	.77	1.11	.62	.48	1.78	2.29	1.02	1.10	.38	.78	.88

CAL YR 1979 TOTAL 23684.5 MEAN 64.9 MAX 1330 MIN 8.6 CFSM .74 IN 10.02
WTR YR 1980 TOTAL 27071.0 MEAN 74.0 MAX 814 MIN 11 CFSM .84 IN 11.46

04166200 EVANS DITCH AT SOUTHFIELD, MI

LOCATION.--Lat 42°27'28", long 83°16'03", in SE¼ sec.28, T.1 N., R.10 E., Oakland County, Hydrologic Unit 04090004, on right bank 20 ft (6 m) upstream from bridge on Nine-Mile Road, at Southfield, 1.6 mi (2.6 km) upstream from mouth, and 5.5 mi (8.8 km) east of Farmington.

DRAINAGE AREA.--9.49 mi² (24.58 km²).

PERIOD OF RECORD.--September 1958 to current year.

GAGE.--Water-stage recorder. Datum of gage is 615.07 ft (187.473 m) city of Southfield datum.

REMARKS.--Records fair except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 8.21 ft³/s (0.233 m³/s), 11.75 in/yr (298 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 903 ft³/s (25.6 m³/s) June 25, 1968, gage height, 12.95 ft (3.947 m), from rating curve extended above 410 ft³/s (11.6 m³/s); no flow part of each day Aug. 30, 31, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 200 ft³/s (5.66 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 24	1400	221	6.26	7.93	2.417
Mar. 17	1100	248	7.02	8.14	2.481
Apr. 4	0100	*582	16.5	*10.58	3.225
Apr. 14	1600	478	13.5	9.82	2.993
May 18	0200	260	7.36	8.26	2.518
June 6	0500	200	5.66	7.81	2.380
Aug. 3	0600	457	12.9	9.69	2.954
Aug. 30	0900	513	14.5	10.10	3.078

Minimum discharge, 0.34 ft³/s (0.010 m³/s) Nov. 5, 6, 12, 21; minimum gage height, 5.59 ft (1.704 m) Mar. 8.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.5	9.2	3.7	4.7	1.4	1.7	13	6.9	6.1	1.4	1.6	38
2	8.4	2.5	3.2	5.0	1.3	1.7	12	5.4	5.0	1.6	42	16
3	2.0	.75	3.0	3.8	1.3	1.7	41	5.7	43	1.6	102	6.5
4	1.1	.62	3.0	3.5	1.3	1.7	134	4.4	4.4	1.6	6.1	4.7
5	1.1	.42	3.8	3.2	1.3	2.5	17	3.8	5.0	13	8.4	3.8
6	8.4	.51	4.4	3.2	1.2	1.8	12	3.5	59	2.5	5.4	3.2
7	2.7	1.6	4.1	3.2	1.2	1.8	10	3.8	35	1.8	4.4	3.0
8	1.1	.51	4.1	3.2	1.2	1.9	43	3.2	13	11	3.2	3.0
9	1.8	5.0	2.7	3.0	1.2	2.0	32	3.2	7.7	2.2	2.5	39
10	.90	5.4	3.5	3.0	[illegible]	3.0	24	3.2	5.4	2.0	16	5.0
11	3.0	.62	2.5	24	1.1	6.0	13	6.9	4.4	1.8	7.3	3.5
12	4.7	.42	5.4	5.4	1.1	2.3	16	3.5	3.5	15	11	3.5
13	1.6	.51	2.5	3.8	1.1	2.3	9.6	15	3.5	2.7	2.5	48
14	1.1	.51	2.2	3.5	1.2	2.4	125	5.4	5.0	2.0	6.5	12
15	.62	4.4	2.0	2.7	1.2	3.0	32	3.2	40	2.2	2.2	5.0
16	.75	2.0	1.9	2.7	1.3	15	16	3.0	7.7	13	1.8	3.8
17	.75	.51	1.8	6.9	1.1	105	11	37	4.1	2.7	2.5	62
18	.75	.62	1.8	4.1	1.1	13	8.8	88	3.2	2.0	2.7	8.4
19	.51	.51	1.8	3.5	1.5	8.0	7.7	10	15	2.0	2.5	5.4
20	1.1	.51	1.8	3.0	2.0	8.0	6.5	6.5	6.5	1.8	17	4.1
21	.62	1.1	2.0	2.7	3.0	79	5.7	5.4	3.0	1.8	29	3.8
22	1.1	23	13	3.0	25	17	5.4	4.7	2.2	2.7	6.1	14
23	2.2	33	15	2.5	5.7	12	5.0	4.4	2.0	1.6	2.7	22
24	1.1	40	76	2.5	3.0	26	4.7	6.5	2.0	1.4	2.2	3.8
25	.90	22	73	2.2	2.0	19	6.1	4.1	2.5	1.2	1.8	4.7
26	1.1	47	13	2.0	1.9	10	4.4	3.8	2.0	3.2	1.8	6.1
27	1.1	6.9	8.4	1.8	1.8	8.8	7.3	3.2	11	7.3	1.8	3.2
28	1.1	29	6.5	1.6	1.7	8.4	21	2.7	2.0	22	1.8	3.0
29	.90	7.3	5.4	1.6	1.7	22	16	2.7	1.6	3.5	5.7	2.7
30	.90	4.7	5.0	1.4	---	10	11	6.5	1.6	2.0	113	2.7
31	1.8	---	4.7	1.4	---	35	---	16	---	2.2	36	---
TOTAL	57.70	251.12	281.2	118.1	71.0	432.0	670.2	281.6	306.4	132.8	449.5	343.9
MEAN	1.86	8.37	9.07	3.81	2.45	13.9	22.3	9.08	10.2	4.28	14.5	11.5
MAX	8.4	47	76	24	25	105	134	88	59	22	113	62
MIN	.51	.42	1.8	1.4	1.1	1.7	4.4	2.7	1.6	1.2	1.6	2.7
CFSM	.20	.88	.96	.40	.26	1.47	2.35	.96	1.08	.45	1.53	1.21
IN.	.23	.98	1.10	.46	.28	1.69	2.63	1.10	1.20	.52	1.76	1.35

CAL YR 1979 TOTAL 2690.62 MEAN 7.37 MAX 183 MIN .42 CFSM .78 IN 10.55
WTR YR 1980 TOTAL 3395.52 MEAN 9.28 MAX 134 MIN .42 CFSM .98 IN 13.31

04166300 UPPER RIVER ROUGE AT FARMINGTON, MI

LOCATION.--Lat 42°27'52", long 83°22'11", in NW¼ sec.27, T.1 N., R.9 E., Oakland County, Hydrologic Unit 04090004, on left bank 800 ft (244 m) downstream from bridge on Shiawassee Road at Farmington.

DRAINAGE AREA.--17.5 mi^2 (45.3 km^2).

PERIOD OF RECORD.--March 1958 to current year.

REVISED RECORDS.--WSP 1912: 1959(M), 1960(M).

GAGE.--Water-stage recorder and concrete control. Datum of gage is 690.4 ft (210.43 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period, which are poor. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--22 years, 11.5 ft^3/s (0.326 m^3/s), 8.92 in/yr (227 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft^3/s (42.5 m^3/s) June 25, 1968, gage height, 8.70 ft (2.652 m); minimum, 0.07 ft^3/s (0.002 m^3/s) Aug. 30, 1966, result of regulation; minimum daily, 0.32 ft^3/s (0.009 m^3/s) Aug. 10, 1964, Aug. 29, 1966.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 80 ft^3/s (2.27 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Nov. 26	0700	80	2.27	3.78	1.152
Dec. 25	1200	114	3.23	4.01	1.222
Mar. 17	unknown	*330	9.35	*a6.49	1.978
Mar. 21	1000	92	2.61	3.85	1.173
Apr. 4	0300	237	6.71	4.72	1.439
Apr. 14	2100	150	4.25	4.23	1.289
May 18	0400	122	3.46	4.07	1.241
June 3	0900	116	3.29	4.03	1.228
June 6	0500	93	2.63	3.88	1.183
Aug. 3	0500	110	3.12	3.99	1.216

a Ice jam.

Minimum discharge, 1.4 ft^3/s (0.040 m^3/s) Oct. 1; minimum gage height, 2.79 ft (0.850 m) Jan. 21.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	1.8	3.6	9.0	9.6	4.8	6.4	27	19	23	4.8	3.8	21
2	7.0	4.0	7.5	8.9	4.8	6.2	22	15	18	4.5	16	16
3	4.8	3.2	6.9	8.3	4.8	6.0	30	13	80	4.2	53	9.4
4	3.4	3.1	6.1	7.7	5.0	6.0	144	12	34	4.5	13	6.1
5	2.7	3.1	7.2	7.3	5.3	6.0	53	10	20	8.2	19	5.1
6	4.2	3.2	9.7	6.2	5.4	6.0	34	9.1	69	7.0	14	4.5
7	5.1	3.4	8.4	6.3	5.6	6.0	26	8.3	53	4.8	7.0	4.2
8	2.9	3.4	8.4	5.6	5.7	6.0	29	7.8	46	6.1	5.2	3.6
9	2.7	4.7	6.5	5.9	5.6	6.4	52	7.6	27	4.8	4.2	8.2
10	2.5	7.6	5.7	7.3	5.6	8.0	42	7.8	22	4.8	18	6.4
11	2.7	5.6	5.5	23	5.7	12	30	9.5	16	4.5	12	4.2
12	4.2	4.7	6.8	15	5.6	9.0	29	9.3	13	9.8	24	4.2
13	2.9	4.5	6.4	11	5.5	8.0	24	12	11	7.6	9.1	22
14	2.5	4.5	5.4	9.0	5.4	10	71	13	10	4.9	7.2	18
15	2.5	5.4	4.7	8.5	5.4	20	92	10	22	4.4	5.7	9.2
16	2.3	6.6	4.4	9.0	5.6	100	51	9.8	24	9.0	4.9	6.8
17	2.5	5.6	4.3	12	5.5	250	34	21	14	7.7	4.9	34
18	2.5	5.4	4.3	10	5.4	72	26	90	11	4.6	6.5	18
19	2.5	6.5	4.3	8.7	5.3	34	22	38	13	3.8	5.2	8.8
20	2.9	6.4	4.5	7.4	5.2	26	19	23	14	3.4	15	6.4
21	2.9	6.6	5.0	6.7	5.4	72	17	17	9.8	3.1	27	5.4
22	3.4	19	17	6.7	22	46	15	13	8.2	3.2	19	11
23	3.4	41	19	5.4	16	36	13	12	7.8	2.6	9.2	32
24	3.4	54	54	7.7	13	39	12	13	7.0	2.2	6.0	11
25	2.9	23	91	6.1	10	42	12	11	7.0	2.0	5.0	7.4
26	2.9	56	41	6.0	8.0	25	11	8.9	7.0	4.2	4.2	7.0
27	2.7	21	22	6.0	7.0	22	11	8.3	6.4	8.9	3.4	5.7
28	2.7	30	15	5.6	6.8	20	25	8.0	6.4	12	3.4	5.0
29	2.9	19	12	5.4	6.6	28	23	8.1	5.8	10	5.4	4.7
30	2.8	12	12	5.0	---	24	27	12	5.1	5.4	8.2	4.4
31	2.7	---	11	5.0	---	33	---	41	---	4.3	6.7	---
TOTAL	97.3	376.1	425.0	252.3	202.0	991.0	1023	497.5	610.5	171.3	345.2	309.7
MEAN	3.14	12.5	13.7	8.14	6.97	32.0	34.1	16.0	20.4	5.53	11.1	10.3
MAX	7.0	56	91	23	22	250	144	90	80	12	53	34
MIN	1.8	3.1	4.3	5.0	4.8	6.0	11	7.6	5.1	2.0	3.4	3.6
CFSM	.18	.71	.78	.47	.40	1.83	1.95	.91	1.17	.32	.63	.59
IN.	.21	.80	.90	.54	.43	2.11	2.17	1.06	1.30	.36	.73	.66

CAL YR 1979 TOTAL 4286.8 MEAN 11.7 MAX 235 MIN 1.4 CFSM .67 IN 9.11
WTR YR 1980 TOTAL 5300.9 MEAN 14.5 MAX 250 MIN 1.8 CFSM .83 IN 11.27

04166500 RIVER ROUGE AT DETROIT, MI

LOCATION.--Lat 42°22'20", long 83°15'20", in SW¼ sec.27, T.1 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 500 ft (152 m) upstream from bridge on Plymouth Road in Detroit, and 4 mi (6 km) upstream from Middle River Rouge.

DRAINAGE AREA.--187 mi^2 (484 km^2).

PERIOD OF RECORD.--October 1930 to current year. Monthly discharge only for some periods, published in WSP 1307.

REVISED RECORDS.--WSP 1034: 1933(M). WSP 1054: 1939, 1943, 1945(M). WSP 1437: 1931-32, 1934, 1936(M), 1937-38, 1944(M), 1945. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 584.00 ft (178.003 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 16, 1948, nonrecording gage at site 1 mi (2 km) downstream at datum 4.6 ft (1.4 m) lower.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year. National Weather Service gage-height telemark at station.

AVERAGE DISCHARGE.--50 years, 113 ft^3/s (3.200 m^3/s), 8.21 in/yr (209 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 13,000 ft^3/s (368 m^3/s) Apr. 5, 1947; maximum gage height, 23.0 ft (7.01 m) Apr. 6, 1947, from floodmark, site and datum then in use; minimum discharge, 1.8 ft^3/s (0.051 m^3/s) Aug. 1, 2, 1964, gage height, 3.00 ft (0.914 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 1,200 ft^3/s (34.0 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Mar. 18	0700	1380	39.1	13.01	3.965	Apr. 15	0800	1560	44.2	12.88	3.926
Apr. 4	1700	*1920	54.4	13.82	4.212	Aug. 3	1000	*1920	54.4	*14.02	4.273

Minimum discharge, 14 ft^3/s (0.40 m^3/s) Oct. 1, gage height, 3.98 ft (1.213 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	53	89	95	43	62	299	162	176	51	36	464
2	69	83	65	88	43	59	215	133	133	49	302	216
3	55	44	58	83	43	57	231	120	586	45	1620	125
4	31	33	60	75	43	56	1630	111	336	43	356	75
5	22	31	62	67	43	56	955	101	136	101	100	61
6	38	29	82	66	43	55	295	91	470	98	192	50
7	76	33	82	62	44	55	213	84	403	61	99	45
8	38	37	82	58	44	56	238	84	526	64	72	41
9	28	53	67	56	44	60	609	80	204	91	62	139
10	27	113	61	58	44	90	424	79	167	63	110	131
11	32	62	55	167	44	130	268	99	127	52	110	62
12	53	42	68	242	45	80	239	89	119	127	194	49
13	48	36	66	174	45	75	220	137	92	127	95	185
14	33	34	55	116	48	70	572	128	89	59	86	282
15	26	44	43	81	50	80	1390	92	313	49	73	101
16	24	71	44	74	50	180	561	84	322	138	49	70
17	25	48	43	97	48	790	270	155	123	105	44	382
18	23	38	42	101	47	1080	209	1010	97	54	56	233
19	24	34	42	87	48	297	180	404	119	43	51	100
20	24	33	44	77	50	190	155	182	178	36	167	77
21	23	32	45	63	52	660	139	137	97	33	340	65
22	24	169	106	64	220	678	129	113	76	30	365	94
23	52	381	208	60	250	286	120	102	67	29	93	366
24	46	564	536	57	120	254	111	107	61	25	61	139
25	30	225	1100	54	100	449	113	97	60	23	49	91
26	27	586	638	52	90	245	110	84	58	21	42	92
27	25	233	224	49	80	193	106	77	79	44	37	67
28	25	315	157	47	74	179	245	72	82	268	35	60
29	27	202	124	46	66	258	188	70	61	132	34	53
30	26	113	109	45	---	242	261	81	53	60	359	50
31	28	---	100	44	---	385	---	233	---	44	283	---
TOTAL	1044	3771	4557	2505	1961	7407	10695	4598	5410	2165	5572	3965
MEAN	33.7	126	147	80.8	67.6	239	357	148	180	69.8	180	132
MAX	76	586	1100	242	250	1080	1630	1010	586	268	1620	464
MIN	15	29	42	44	43	55	106	70	53	21	34	41
CFSM	.18	.67	.79	.43	.36	1.28	1.91	.79	.96	.37	.96	.71
IN.	.21	.75	.91	.50	.39	1.47	2.13	.91	1.08	.43	1.11	.79

CAL YR 1979 TOTAL 45308 MEAN 124 MAX 2030 MIN 12 CFSM .66 IN 9.01
WTR YR 1980 TOTAL 53650 MEAN 147 MAX 1630 MIN 15 CFSM .79 IN 10.67

04168000 LOWER RIVER ROUGE AT INKSTER, MI

LOCATION.--Lat 42°18'00", long 83°18'00", in SW¼ SE¼ sec.19, T.2 S., R.10 E., Wayne County, Hydrologic Unit 04090004, on right bank 10 ft (3 m) downstream from bridge on John Daly Road, 0.6 mi (1.0 km) northeast of Inkster, and 4.8 mi (7.7 km) upstream from mouth.

DRAINAGE AREA.--83.2 mi^2 (215.5 km^2).

PERIOD OF RECORD.--June 1947 to current year.

REVISED RECORDS.--WSP 1174: 1948(M). WSP 1437: 1949. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 593.14 ft (180.789 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 20, 1948, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--33 years, 51.7 ft^3/s (1.464 m^3/s), 8.44 in/yr (214 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 3,600 ft^3/s (102 m^3/s) June 26, 1968, gage height, 13.62 ft (4.151 m); minimum, 0.2 ft^3/s (0.006 m^3/s) Sept. 13, 1955, Jan. 23, 1961.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 900 ft^3/s (25.5 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Mar. 18	1000	994	28.2	9.18	2.798
Apr. 5	0100	*1260	35.7	*10.05	3.063
Apr. 15	1400	1010	28.6	9.23	2.813

Minimum discharge, 1.3 ft^3/s (0.037 m^3/s) Oct. 1, gage height, 2.62 ft (0.799 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	2.2	17	23	32	5.7	7.0	216	66	29	7.9	11	186
2	21	17	16	28	5.6	6.6	133	52	81	7.5	140	153
3	3.1	5.9	14	24	5.5	6.0	149	42	627	9.6	274	126
4	2.7	4.2	12	20	5.4	6.0	895	33	262	9.3	103	51
5	3.4	3.2	13	17	5.4	8.0	625	28	90	25	45	29
6	20	2.9	19	14	5.3	7.2	172	23	328	14	42	20
7	11	5.2	21	12	5.3	7.9	117	19	275	8.2	23	13
8	3.9	3.7	21	10	5.2	8.2	143	17	406	6.9	15	11
9	3.1	17	12	8.5	5.2	9.6	268	17	141	6.9	10	137
10	2.7	25	11	7.5	5.1	38	275	15	81	6.3	25	96
11	4.5	11	11	66	5.1	31	162	27	51	5.4	20	38
12	11	5.3	18	42	5.0	25	138	18	35	46	28	24
13	7.4	4.2	13	34	5.0	22	119	48	27	16	21	63
14	6.4	3.2	10	23	5.0	20	360	42	23	5.4	14	118
15	3.2	6.9	10	20	5.0	18	838	25	237	4.8	15	59
16	2.9	7.4	9.3	21	5.0	35	276	20	549	178	10	35
17	3.1	6.1	7.2	34	5.0	557	133	81	157	87	9.3	98
18	4.1	4.4	6.6	42	5.0	715	95	348	80	25	7.9	117
19	7.7	4.6	6.9	34	6.0	166	73	165	77	18	6.9	52
20	7.8	3.9	9.6	25	5.7	110	57	81	78	8.6	81	32
21	6.0	3.6	11	22	7.0	417	48	53	43	18	190	24
22	4.6	40	30	18	140	435	42	40	27	11	152	42
23	11	98	55	15	148	158	38	30	21	6.0	46	211
24	6.9	148	323	12	42	159	32	24	17	7.5	21	98
25	6.2	63	486	10	22	328	32	19	15	9.6	14	47
26	5.3	174	272	9.0	13	138	27	15	15	6.0	10	36
27	4.5	60	103	8.0	10	101	23	11	14	4.5	8.2	30
28	3.6	110	70	7.0	9.0	90	73	10	11	108	7.9	21
29	3.4	59	52	6.5	8.0	158	69	10	9.6	35	9.3	17
30	3.8	30	43	6.0	---	158	82	62	8.9	17	18	15
31	4.4	---	37	5.8	---	272	---	38	---	16	77	---
TOTAL	190.9	943.7	1745.6	633.3	504.5	4217.5	5715	1479	3815.5	734.4	1454.5	1999
MEAN	6.16	31.5	56.3	20.4	17.4	136	191	47.7	127	23.7	46.9	66.6
MAX	21	174	486	66	148	715	895	348	627	178	274	211
MIN	2.2	2.9	6.6	5.8	5.0	6.0	27	10	8.9	4.5	6.9	11
CFSM	.07	.38	.68	.25	.21	1.64	2.30	.57	1.53	.29	.56	.80
IN.	.09	.42	.78	.28	.23	1.89	2.56	.66	1.71	.33	.65	.89

CAL YR 1979 TOTAL 19751.6 MEAN 54.1 MAX 1710 MIN 2.1 CFSM .65 IN 8.83
WTR YR 1980 TOTAL 23432.9 MEAN 64.0 MAX 895 MIN 2.2 CFSM .77 IN 10.48

04170000 HURON RIVER AT MILFORD, MI

LOCATION.--Lat 42°34'44", long 83°37'36", in NE¼ sec.16, T.2 N., R.7 E., Oakland County, Hydrologic Unit 04090005, on left bank 40 ft (12 m) downstream from bridge on General Motors Road, 0.5 mi (0.8 km) downstream from Sherwood Creek, and 0.5 mi (0.8 km) west of Milford.

DRAINAGE AREA.--132 mi^2 (342 km^2).

PERIOD OF RECORD.--September 1948 to current year.

REVISED RECORDS.--WSP 1337: 1952(m). WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 880.00 ft (268.224 m) National Geodetic Vertical Datum of 1929. Prior to Apr. 1, 1970, at site 240 ft (73 m) upstream at same datum.

REMARKS.--Records good. Flow below about 300 ft^3/s (8.50 m^3/s) regulated by powerplant 1.5 mi (2.4 km) above station prior to May 20, 1957; occasional regulation for lake level control since. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 96.7 ft^3/s (2.739 m^3/s), 9.95 in/yr (253 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, [illegible]45 ft^3/s (18.3 m^3/s) Apr. 5, 1950; maximum gage height, 8.26 ft (2.518 m) June 28, 1968; minimum daily discharge, 5.2 ft^3/s (0.15 m^3/s) Oct. 21, 1971.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 279 ft^3/s (7.90 m^3/s) Apr. 16, gage height, 6.60 ft (2.012 m); minimum, 31 ft^3/s (0.88 m^3/s) July 21, gage height, 4.29 ft (1.308 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980 MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	40	55	105	105	65	59	176	177	108	38	49	116
2	48	57	101	100	63	54	171	173	100	40	56	110
3	48	54	95	98	61	58	177	163	127	41	90	94
4	50	56	90	96	60	59	239	149	130	44	90	81
5	53	57	92	92	60	60	260	134	113	52	79	70
6	54	58	97	90	59	61	245	115	118	53	76	64
7	54	60	95	90	60	66	225	105	127	51	72	61
8	55	63	95	90	59	67	219	104	139	50	74	58
9	54	69	92	84	58	68	236	100	137	51	74	66
10	49	77	90	83	58	67	247	94	131	52	63	68
11	44	69	89	103	58	66	244	91	128	48	67	65
12	47	62	96	103	58	66	234	88	124	45	81	61
13	50	56	92	104	59	66	227	97	113	48	78	72
14	50	53	84	98	59	66	235	98	95	43	68	94
15	46	56	80	98	60	67	264	94	100	43	65	84
16	46	59	78	98	61	72	275	96	110	52	66	74
17	48	56	75	102	60	137	255	102	106	50	67	100
18	50	54	73	103	60	200	225	146	104	46	66	103
19	53	53	70	100	60	191	208	155	106	41	71	91
20	55	52	67	96	59	171	198	147	110	34	86	83
21	57	55	66	93	64	186	189	124	100	35	89	78
22	59	71	70	90	93	198	179	114	84	40	89	93
23	58	100	78	87	95	188	171	107	75	35	80	159
24	54	130	88	84	83	179	165	104	72	38	83	172
25	54	123	120	81	78	184	160	97	73	38	69	163
26	54	134	125	77	73	174	153	88	71	38	57	146
27	53	128	130	76	70	166	149	83	65	36	63	133
28	51	127	125	74	69	163	170	81	56	45	61	125
29	52	124	120	73	63	168	185	81	51	56	56	117
30	51	114	115	72	---	171	184	87	40	55	63	101
31	49	---	110	69	---	172	---	101	---	53	87	---
TOTAL	1586	2282	2903	2809	1885	3670	6265	3495	3013	1391	2235	2902
MEAN	51.2	76.1	93.6	90.6	65.0	118	209	113	100	44.9	72.1	96.7
MAX	59	134	130	105	95	200	275	177	139	56	90	172
MIN	40	52	66	69	58	54	149	81	40	34	49	58
CFSM	.39	.58	.71	.69	.49	.89	1.58	.86	.76	.34	.55	.73
IN.	.45	.64	.82	.79	.53	1.03	1.77	.98	.85	.39	.63	.82

CAL YR 1979 TOTAL 31427 MEAN 86.1 MAX 295 MIN 21 CFSM .65 IN 8.86
WTR YR 1980 TOTAL 34436 MEAN 94.1 MAX 275 MIN 34 CFSM .71 IN 9.70

04170500 HURON RIVER NEAR NEW HUDSON, MI

LOCATION.--Lat 42°30'45", long 83°40'35", in NE¼ sec.1, T.1 N., R.6 E., Livingston County, Hydrologic Unit 04090005, on right bank 150 ft (46 m) downstream from Kent Lake Dam, 2 mi (3 km) upstream from Woodruff Creek, and 3 mi (5 km) west of New Hudson.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--August 1948 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 868.00 ft (264.566 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good. Occasional regulation by Kent Lake. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--32 years, 111 ft³/s (3.144 m³/s), 10.18 in/yr (259 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,080 ft³/s (30.6 m³/s) Dec. 29, 1950, gage height, 5.05 ft (1.539 m), from rating curve extended above 600 ft³/s (17.0 m³/s); minimum, 2.6 ft³/s (0.074 m³/s) May 27, 1963, gage height, 0.53 ft (0.162 m); minimum daily, 6.4 ft³/s (0.18 m³/s) May 7, 1963.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 278 ft³/s (7.87 m³/s) Nov. 3, gage height, 2.61 ft (0.796 m); minimum daily, 27 ft³/s (0.765 m³/s) May 13.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	53	111	142	125	88	66	187	174	109	53	64	123
2	65	107	133	122	84	83	188	171	110	54	73	127
3	62	160	124	119	83	81	190	167	133	52	106	123
4	62	194	115	115	80	81	229	157	135	54	104	112
5	63	142	108	110	76	81	180	147	130	64	99	100
6	68	181	108	108	74	82	116	133	137	70	96	92
7	70	164	109	110	72	83	170	119	141	66	91	83
8	69	131	110	105	72	87	197	112	151	70	90	79
9	72	172	107	103	72	92	215	107	149	67	91	82
10	70	190	107	99	73	91	230	102	146	68	88	84
11	69	146	103	109	73	92	166	102	143	72	87	81
12	69	125	110	113	74	91	125	52	139	75	97	82
13	66	176	108	115	73	92	173	27	135	73	95	93
14	68	164	103	114	72	93	211	54	128	69	91	109
15	68	132	101	114	75	93	229	71	130	66	88	107
16	69	151	99	114	77	96	248	84	132	76	81	101
17	73	172	92	116	77	144	247	93	123	78	81	122
18	73	133	87	118	75	200	238	122	123	71	81	123
19	72	112	83	117	74	210	220	140	125	65	82	120
20	75	103	81	116	74	207	209	141	126	59	102	113
21	79	97	79	114	76	220	196	135	120	53	112	109
22	80	98	86	113	96	219	186	127	112	56	115	118
23	80	118	93	111	105	216	179	123	109	51	108	158
24	80	139	112	109	104	141	94	118	100	45	100	173
25	79	148	145	109	102	129	81	118	94	43	96	176
26	77	146	151	105	95	159	115	109	90	46	85	170
27	79	158	155	104	93	169	133	98	90	47	80	155
28	80	160	148	101	91	175	153	91	80	54	78	150
29	157	152	142	100	87	180	164	92	70	61	75	140
30	163	142	136	97	---	183	174	92	64	64	80	133
31	125	---	130	92	---	187	---	103	---	65	105	---
TOTAL	2435	4324	3507	3417	2367	4143	5443	3481	3574	1905	2821	3538
MEAN	78.5	144	113	110	81.6	134	181	112	119	61.5	91.0	118
MAX	163	194	155	125	105	220	248	174	151	78	115	176
MIN	53	97	79	92	72	81	81	27	64	43	64	79
CFSM	.53	.97	.76	.74	.55	.91	1.22	.76	.80	.42	.62	.80
IN.	.61	1.09	.88	.86	.59	1.04	1.37	.87	.90	.48	.71	.89

CAL YR 1979 TOTAL 38234 MEAN 105 MAX 262 MIN 36 CFSM .71 IN 9.61
WTR YR 1980 TOTAL 40955 MEAN 112 MAX 248 MIN 27 CFSM .76 IN 10.29

04172000 HURON RIVER NEAR HAMBURG, MI

LOCATION.--Lat 42°27'55", long 83°48'00", in sec.24, T.1 N., R.5 E., Livingston County, Hydrologic Unit 04090005, on right bank at downstream side of bridge on Hamburg Road, 1.1 mi (1.8 km) north of Hamburg, and 3 mi (5 km) upstream from Strawberry Lake.

DRAINAGE AREA.--308 mi² (798 km²).

PERIOD OF RECORD.--October 1951 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 850.00 ft (259.080 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). Prior to Aug. 12, 1953, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by Kent Lake, 11 mi (18 km) above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--29 years, 208 ft³/s (5.891 m³/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,560 ft³/s (44.2 m³/s) May 15, 1956; maximum gage height, 8.46 ft (2.579 m) June 30, 1968; minimum discharge, 32 ft³/s (0.91 m³/s) July 2, 3, 1965; minimum gage height, 3.16 ft (0.963 m) Aug. 1-3, 1964.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 569 ft³/s (16.1 m³/s) Apr. 18, gage height, 5.69 ft (1.734 m); minimum, 81 ft³/s (2.29 m³/s) Oct. 1, gage height, 3.54 ft (1.079 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	81	176	280	292	150	155	413	373	223	137	117	207
2	88	162	262	275	150	150	416	379	226	129	123	227
3	96	147	240	261	140	145	422	376	266	122	160	230
4	97	167	224	240	140	140	475	368	291	116	195	223
5	96	215	210	220	130	139	518	350	295	117	214	209
6	97	209	207	210	130	134	554	329	309	121	216	191
7	104	210	207	200	125	132	521	303	324	120	209	174
8	105	220	207	180	125	136	510	274	346	119	198	159
9	108	197	201	180	125	142	526	254	355	117	186	154
10	108	208	196	180	125	144	541	239	355	117	185	153
11	110	240	190	180	125	144	546	234	342	115	184	147
12	113	224	198	190	125	144	526	228	326	114	191	143
13	113	190	201	200	125	144	464	187	308	116	195	148
14	108	202	196	200	125	145	456	177	295	113	196	167
15	107	221	187	200	130	142	486	183	290	109	189	178
16	105	201	180	200	125	142	516	189	295	113	179	180
17	106	199	170	200	125	200	548	199	288	119	171	206
18	108	220	160	200	125	305	567	257	277	118	167	235
19	108	202	150	200	125	394	560	297	270	113	163	240
20	107	173	150	200	126	462	539	321	271	107	175	235
21	108	156	140	200	117	510	508	329	263	100	200	224
22	112	156	150	190	132	525	477	325	248	98	221	220
23	116	179	165	190	164	527	447	307	231	95	219	257
24	118	227	199	190	183	520	415	287	219	91	206	284
25	115	257	268	190	182	473	342	269	208	87	194	307
26	113	284	305	180	170	416	295	251	199	84	182	311
27	110	299	331	180	165	398	294	235	189	85	167	302
28	111	307	341	170	160	392	316	218	178	92	156	289
29	110	307	337	170	160	392	338	205	165	104	149	273
30	149	296	325	170	---	392	359	200	148	117	150	257
31	185	---	307	160	---	406	---	216	---	118	166	---
TOTAL	3412	6451	6884	6198	4024	8590	13895	8359	8000	3423	5623	6530
MEAN	110	215	222	200	139	277	463	270	267	110	181	218
MAX	185	307	341	292	183	527	567	379	355	137	221	311
MIN	81	147	140	160	117	132	294	177	148	84	117	143
CFSM	.36	.70	.72	.65	.45	.90	1.50	.88	.87	.36	.59	.71
IN.	.41	.78	.83	.75	.49	1.04	1.68	1.01	.97	.41	.68	.79

CAL YR 1979 TOTAL 71475 MEAN 196 MAX 576 MIN 74 CFSM .64 IN 8.63
WTR YR 1980 TOTAL 81394 MEAN 222 MAX 567 MIN 81 CFSM .72 IN 9.83

04173000 HURON RIVER NEAR DEXTER, MI

LOCATION.--Lat 42°23'10", long 83°54'40", in S½ sec.13, T.1 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on North Territorial Road, 0.5 mi (0.8 km) east of Hudson Mills, 2.0 mi (3.2 km) downstream from Portage Lake Outlet and 4.0 mi (6.4 km) north of Dexter.

DRAINAGE AREA.--522 mi² (1,352 km²).

PERIOD OF RECORD.--Water year 1971 to November 1980 (discontinued).

REMARKS.--Water discharge are based on stage-discharge relationship developed during operation of a gaging-station at this site.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV 06...	0930	181	620	8.1	8.5	6.0	11.0	88	2.6	10	<10	--
JAN 08...	1025	281	540	7.8	-7.0	.0	13.4	97	5.2	30	<10	--
MAR 18...	1030	181	610	7.8	.0	1.5	12.6	89	4.0	10	<10	260
MAY 06...	1230	506	550	8.2	20.0	16.5	10.6	94	1.4	<30	<30	--
JUL 10...	0900	160	510	7.9	22.0	24.5	7.6	93	1.0	390	30	--
SEP 23...	1045	355	500	8.1	14.0	18.0	8.8	96	1.6	70	30	230
NOV 04...	0950	282	480	7.9	10.5	9.5	12.2	91	2.1	<30	<30	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV 06...	--	--	--	--	--	230	0	190	2.9	--	--	--
JAN 08...	--	--	--	--	--	230	0	190	5.8	--	--	--
MAR 18...	56	70	21	28	2.2	250	0	200	6.3	47	47	.2
MAY 06...	--	--	--	--	--	250	0	200	2.5	--	--	--
JUL 10...	--	--	--	--	--	240	0	200	4.8	--	--	--
SEP 23...	49	59	20	21	2.1	220	0	180	2.8	40	38	.2
NOV 04...	--	--	--	--	--	250	0	210	5.0	--	--	--

04173000 HURON RIVER NEAR DEXTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)
NOV 06...	--	--	--	--	.19	.020	.21	.19	.440	--	--	--
JAN 08...	--	--	--	--	.42	.020	.44	.42	.280	--	--	--
MAR 18...	6.5	375	347	183	.36	.020	.38	.36	.090	.66	.75	1.1
MAY 06...	--	--	--	--	.28	.010	.29	.28	.580	--	--	--
JUL 10...	--	--	--	--	.18	.010	.19	.18	.900	--	--	--
SEP 23...	8.6	326	298	312	.11	.000	.11	.11	.050	.36	.41	.52
NOV 04...	--	--	--	--	.14	.010	.15	.14	.490	--	--	--

DATE	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	COBALT, DIS-SOLVED (UG/L AS CO)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 06...	--	.010	.010	--	--	--	--	--	--	--	--	.00
JAN 08...	--	.010	.010	--	--	--	--	--	--	--	--	<.10
MAR 18...	5.0	.030	.020	.010	--	--	--	--	--	--	--	.00
MAY 06...	--	.010	.010	--	--	--	--	--	--	--	--	.00
JUL 10...	--	.010	.010	--	--	--	--	--	--	--	--	<.10
SEP 23...	2.3	.020	.000	.000	2	1	0	0	0	10	.1	<.10
NOV 04...	--	.020	.020	--	--	--	--	--	--	--	--	<.10

04173254 MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°16'54", long 83°55'22", in NE¼ sec.26, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Jerusalem Road, 0.3 mi (0.5 km) upstream from North Fork Mill Creek, 2.0 mi (3.2 km) southeast of Lima Center, 2.1 mi (3.4 km) upstream from gaging station near Dexter, and 6.2 mi (10 km) upstream from Huron River.

DRAINAGE AREA.--59.8 mi^2 (155 km^2).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

REMARKS.--Estimates of water discharge are based on current records of streamflow at the gaging station near Dexter and records of streamflow at the partial-record station, Mill Creek near Lima Center.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAMFLOW, INSTANTANEOUS (CFS)	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, AIR (DEG C)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLIFORM, COMPLETE (MPN)	COLIFORM, FECAL, EC BROTH (MPN)
NOV 06...	1115	12	720	8.1	10.5	4.5	12.0	96	2.0	190	80
JAN 08...	1315	E24	810	8.0	-5.5	.0	12.0	87	2.2	50	<10
MAR 19...	0835	E126	420	7.3	11.5	1.0	11.4	81	7.3	740	620
MAY 06...	1530	E26	800	8.1	20.0	18.0	12.8	78	1.5	70	40
JUL 10...	1120	12	695	7.8	24.0	20.0	9.4	115	.6	1200	430
SEP 23...	1450	E83	675	7.7	19.5	17.0	7.5	82	3.3	1500	1200
NOV 04...	1300	E25	750	8.0	9.5	9.5	11.8	95	1.5	280	150

DATE	HARDNFSS (MG/L AS CACO3)	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV 06...	--	--	--	--	--	--	340	0	280	4.3	--
JAN 08...	--	--	--	--	--	--	330	0	270	5.3	--
MAR 19...	150	37	41	12	7.8	3.4	140	0	110	11	26
MAY 06...	--	--	--	--	--	--	320	0	260	4.1	--
JUL 10...	--	--	--	--	--	--	380	0	310	9.6	--
SEP 23...	370	130	110	22	8.8	6.2	310	0	250	9.3	91
NOV 04...	--	--	--	--	--	--	390	0	320	6.2	--

04173254 MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
NOV 06...	--	--	--	--	--	--	.41	.020	.43	.41	.230
JAN 08...	--	--	--	--	--	--	2.8	.040	2.8	2.8	.320
MAR 19...	15	.2	4.8	214	114	--	.91	.030	.94	.91	.300
MAY 06...	--	--	--	--	--	--	.98	.020	1.0	.98	.360
JUL 10...	--	--	--	--	--	--	.22	.010	.23	.22	.560
SEP 23...	27	.3	12	478	441	E117	2.4	.060	2.5	2.4	.030
NOV 04...	--	--	--	--	--	--	.32	.000	.32	.32	.180

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)
NOV 06...	--	--	--	--	.010	.010	--	--	--	--
JAN 08...	--	--	--	--	.030	.020	--	--	--	--
MAR 19...	.67	.97	1.9	8.5	.070	.010	.000	--	--	--
MAY 06...	--	--	--	--	.010	.010	--	--	--	--
JUL 10...	--	--	--	--	.030	.030	--	--	--	--
SEP 23...	1.2	1.2	3.7	16	.120	.020	.000	2	0	<10
NOV 04...	--	--	--	--	.020	.020	--	--	--	--

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	ZINC, DIS-SOLVED (UG/L AS ZN)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 06...	--	--	--	--	--	--	--	--	--	.00
JAN 08...	--	--	--	--	--	--	--	--	--	<.10
MAR 19...	--	--	--	--	--	--	--	--	--	.00
MAY 06...	--	--	--	--	--	--	--	--	--	.00
JUL 10...	--	--	--	--	--	--	--	--	--	<.10
SEP 23...	0	0	30	0	60	<.1	2	0	10	<.10
NOV 04...	--	--	--	--	--	--	--	--	--	<.10

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI

LOCATION.--Lat 42°19'34", long 84°00'57", in SE¼ sec.1, T.2 S., R.3 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on McKinley Road, 0.4 mi (0.6 km) upstream from Letts Creek, 0.5 mi (0.8 km) north of Chelsea, and 6.6 mi (10.6 km) upstream from Mill Creek.

DRAINAGE AREA.--14.6 mi² (37.8 km²).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV 06...	1015	8.75	590	8.0	9.5	4.0	11.2	90	1.0	140	<10	--
JAN 08...	1115	8.36	460	7.4	-7.0	.0	12.4	90	3.1	30	<10	--
MAR 18...	1215	6.81	265	7.5	2.0	1.0	11.9	84	6.6	120	<10	120
MAY 06...	1345	8.09	520	8.0	20.5	18.0	8.8	88	1.6	230	210	--
JUL 10...	1020	8.70	520	7.6	22.5	17.5	8.5	104	1.5	930	300	--
SEP 23...	1315	7.60	490	7.9	18.0	15.5	8.4	91	2.4	750	280	270
NOV 04...	1110	7.82	490	8.0	10.0	9.5	10.8	104	1.8	30	<30	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV 06...	--	--	--	--	--	290	0	240	4.6	--	--	--
JAN 08...	--	--	--	--	--	230	0	190	15	--	--	--
MAR 18...	30	34	8.5	5.1	2.7	110	0	90	5.6	19	13	.1
MAY 06...	--	--	--	--	--	250	0	200	4.0	--	--	--
JUL 10...	--	--	--	--	--	280	0	230	11	--	--	--
SEP 23...	34	79	18	9.3	1.7	290	0	240	5.7	19	23	.2
NOV 04...	--	--	--	--	--	300	0	250	4.8	--	--	--

04173310 NORTH FORK MILL CREEK NEAR CHELSEA, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)
NOV											
06...	--	--	--	.22	.01	.23	.22	.19	--	--	--
JAN											
08...	--	--	--	.78	.01	.79	.78	.54	--	--	--
MAR											
18...	5.0	160	144	.53	.02	.55	.53	.08	1.3	1.4	2.0
MAY											
06...	--	--	--	.30	.01	.31	.30	.46	--	--	--
JUL											
10...	--	--	--	.19	.01	.20	.19	.70	--	--	--
SEP											
23...	17	332	311	.17	.00	.17	.17	.01	.58	.59	.76
NOV											
04...	--	--	--	.07	.00	.07	.07	.30	--	--	--

DATE	NITRO- GEN, TOTAL (MG/L AS NO3)	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV											
06...	--	.030	.01	--	--	--	--	--	--	--	.00
JAN											
08...	--	.060	.03	--	--	--	--	--	--	--	<.10
MAR											
18...	8.6	.120	.00	.01	--	--	--	--	--	--	.00
MAY											
06...	--	.020	.00	--	--	--	--	--	--	--	.00
JUL											
10...	--	.030	.01	--	--	--	--	--	--	--	<.10
SEP											
23...	3.4	.040	.01	.00	2	0	110	0	50	<.1	<.10
NOV											
04...	--	.020	.01	--	--	--	--	--	--	--	<.10

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI

LOCATION.--Lat 42°17'46", long 83°57'33", in SW¼ sec.23, T.2 S., R.4 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Dancer Road, 1.2 mi (1.9 km) southeast of Lima Center, 5.1 mi (8.2 km) downstream from Lotts Creek, and 1.1 mi (1.8 km) upstream from Mill Creek.

DRAINAGE AREA.--59.0 mi² (153 km²).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

REMARKS.--Estimates of water discharge based on previous streamflow partial-record data and correlation with station 04173500.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV												
06...	1230	11	890	8.0	9.5	5.0	12.0	96	2.1	210	10	--
JAN												
08...	1330	E24	725	7.7	-5.5	.0	11.5	83	4.5	350	<10	--
MAR												
19...	1035	E220	436	7.6	8.0	1.5	10.6	76	8.4	480	<10	200
MAY												
07...	1000	E36	655	7.7	8.0	11.0	9.4	87	2.8	930	200	--
JUL												
10...	1500	13	760	7.8	28.5	22.5	12.4	151	.2	640	<30	--
SEP												
24...	0915	E63	660	7.7	12.5	14.0	7.5	74	1.4	1200	210	340
NOV												
04...	1350	E17	710	7.9	10.0	9.5	11.2	100	2.1	200	110	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV												
06...	--	--	--	--	--	320	0	260	5.1	--	--	--
JAN												
08...	--	--	--	--	--	310	0	250	9.9	--	--	--
MAR												
19...	90	59	12	6.5	6.0	130	0	110	5.2	66	18	.2
MAY												
07...	--	--	--	--	--	320	0	260	10	--	--	--
JUL												
10...	--	--	--	--	--	320	0	260	8.1	--	--	--
SEP												
24...	65	98	22	21	2.5	340	0	270	11	44	45	.3
NOV												
04...	--	--	--	--	--	350	0	290	7.0	--	--	--

04173350 NORTH FORK MILL CREEK NEAR LIMA CENTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)
NOV												
06...	--	--	--	1.2	.050	1.3	1.2	1.200	--	--	--	--
JAN												
08...	--	--	--	.02	.020	.04	.02	.020	--	--	--	--
MAR												
19...	5.4	303	253	3.3	.070	3.4	3.3	.670	1.6	2.3	5.7	25
MAY												
07...	--	--	--	.59	.020	.61	.59	.440	--	--	--	--
JUL												
10...	--	--	--	1.4	.080	1.5	1.4	.640	--	--	--	--
SEP												
24...	15	500	418	.63	.070	.70	.66	.030	.73	.76	1.5	6.5
NOV												
04...	--	--	--	.80	.000	.80	.80	.220	--	--	--	--

DATE	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	COBALT, DIS-SOLVED (UG/L AS CO)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV											
06...	.060	.060	--	--	--	--	--	--	--	--	.00
JAN											
08...	.060	.040	--	--	--	--	--	--	--	--	<.10
MAR											
19...	.260	.040	.000	--	--	--	--	--	--	--	.00
MAY											
07...	.020	.020	--	--	--	--	--	--	--	--	.00
JUL											
10...	.050	.050	--	--	--	--	--	--	--	--	<.10
SEP											
24...	.100	.030	.000	1	0	0	120	0	80	<.1	<.10
NOV											
04...	.030	.010	--	--	--	--	--	--	--	--	<.10

04173500 MILL CREEK NEAR DEXTER, MI

LOCATION.--Lat 42°18'00", long 83°53'55", in SW¼ sec.18, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 12 ft (4 m) downstream from bridge on Parker Road, 2.5 mi (4.0 km) south of Dexter, and 4 mi (6 km) upstream from mouth.

DRAINAGE AREA.--128 mi² (332 km²).

PERIOD OF RECORD.--February 1952 to current year.

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Altitude of gage is 850 ft (259 m) from topographic map (nearest 10 ft). Prior to May 23, 1958, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--28 years, 78.0 ft³/s (2.209 m³/s), 8.28 in/yr (210 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,500 ft³/s (42.5 m³/s) June 26, 1968, gage height, 12.95 ft (3.947 m); minimum, 7.3 ft³/s (0.21 m³/s) Dec. 13, 1963; minimum gage height, 4.94 ft (1.506 m) Dec. 13, 1963, Feb. 22, 1964.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 500 ft³/s (14.2 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 18	0200	*818	23.2	*10.59	3.228	Apr. 4	1500	632	17.9	9.85	3.002

Minimum discharge, 19 ft³/s (0.54 m³/s) Oct. 1, gage height, 5.34 ft (1.628 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	19	31	67	90	35	43	230	153	70	36	29	186
2	20	36	58	81	34	36	190	134	87	36	91	232
3	20	31	54	74	33	32	179	118	301	34	201	188
4	21	28	47	67	32	32	551	105	276	32	160	119
5	21	27	48	60	32	32	479	93	169	36	99	88
6	23	27	69	58	32	34	348	83	121	36	91	72
7	26	27	67	56	31	32	252	74	116	32	70	63
8	24	27	67	54	31	34	212	69	187	31	57	58
9	24	28	56	52	31	37	305	66	132	31	48	65
10	24	41	51	50	31	41	321	63	100	32	45	79
11	25	36	49	63	30	51	266	70	78	30	46	66
12	27	31	57	92	30	53	224	69	67	29	50	58
13	27	29	58	78	30	42	194	75	59	29	44	69
14	25	29	49	55	30	40	213	82	55	28	42	102
15	25	30	50	52	30	45	342	72	94	25	41	82
16	24	33	41	52	30	110	275	66	214	38	37	71
17	25	32	40	88	30	617	203	70	154	43	35	159
18	24	31	37	103	32	708	169	247	110	34	35	195
19	25	30	34	89	32	440	148	214	90	30	34	137
20	25	30	33	77	32	311	132	149	98	28	197	102
21	25	31	32	66	36	308	119	115	79	27	224	84
22	26	41	46	60	187	294	110	94	67	25	213	77
23	29	66	86	56	204	228	99	79	59	25	147	164
24	28	104	166	52	121	197	92	72	54	24	95	136
25	27	88	421	50	85	230	131	66	51	23	72	104
26	26	119	372	47	66	174	129	59	47	22	62	90
27	26	111	277	44	58	152	112	54	44	26	54	78
28	27	101	192	42	54	145	162	50	41	37	49	69
29	26	93	144	40	50	171	174	48	38	41	45	64
30	26	77	119	38	---	181	171	47	37	34	42	60
31	26	---	103	37	---	225	---	72	---	31	53	---
TOTAL	766	1445	2990	1923	1489	5075	6532	2828	3095	965	2508	3117
MEAN	24.7	48.2	96.5	62.0	51.3	164	218	91.2	103	31.1	80.9	104
MAX	29	119	421	103	204	708	551	247	301	43	224	232
MIN	19	27	32	37	30	32	92	47	37	22	29	58
CFSM	.19	.38	.75	.48	.40	1.28	1.70	.71	.81	.24	.63	.81
IN.	.22	.42	.87	.56	.43	1.47	1.90	.82	.90	.28	.73	.91

CAL YR 1979 TOTAL 24784 MEAN 67.9 MAX 656 MIN 19 CFSM .53 IN 7.20
WTR YR 1980 TOTAL 32733 MEAN 89.4 MAX 708 MIN 19 CFSM .78 IN 9.51

04174050 HURON RIVER AT DELHI MILLS, MI

LOCATION.--Lat 42°20'01", long 83°48'34", in SE¼ sec.2, T.2 S., R.5 E., Washtenaw County, Hydrologic Unit 04090005, at bridge on Delhi Road, 5.0 mi (8.0 km) northwest of Ann Arbor, 5.2 mi (8.4 km) downstream from Mill Creek, 5.1 mi (8.2 km) upstream from Barton Dam, and 60.0 mi (96.5 km) upstream from mouth.

DRAINAGE AREA.--699 mi² (1,810 km²).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV												
06...	0815	15.10	650	8.1	6.5	4.5	11.0	88	2.4	40	10	0
JAN												
08...	0930	14.70	600	7.7	-8.0	.0	13.0	94	4.6	90	20	--
MAR												
18...	0810	13.54	324	7.6	-3.0	.0	12.4	87	9.5	1450	<10	130
MAY												
06...	1030	14.20	14	8.0	16.5	14.5	9.3	93	2.1	70	<30	--
JUL												
09...	1530	15.15	525	7.8	22.0	23.5	7.3	89	1.5	640	<30	--
SEP												
23...	0900	14.27	520	8.0	11.5	18.5	7.7	84	1.9	1200	750	260
NOV												
04 ···	0830	14.68	520	8.0	10.0	9.5	11.1	100	2.3	40	<30	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV												
06...	0	--	--	--	--	250	0	200	3.2	--	--	--
JAN												
08...	--	--	--	--	--	250	0	200	8.0	--	--	--
MAR												
18...	36	36	8.7	11	6.7	110	0	90	4.4	31	23	.2
MAY												
06...	--	--	--	--	--	250	0	200	4.0	--	--	--
JUL												
09...	--	--	--	--	--	260	0	210	6.6	--	--	--
SEP												
23...	55	71	20	18	2.3	250	0	200	4.0	45	37	.2
NOV												
04 ···	--	--	--	--	--	270	0	220	4.3	--	--	--

04174050 HURON RIVER AT DELHI MILLS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)
NOV												
06...	--	--	--	.34	.02	.36	.34	.38	--	--	--	--
JAN												
08...	--	--	--	1.4	.02	1.4	1.4	.33	--	--	--	--
MAR												
19...	4.4	210	181	1.5	.05	1.6	1.5	.58	1.7	2.3	3.9	17
MAY												
06...	--	--	--	.40	.01	.41	.40	.24	--	--	--	--
JUL												
09...	--	--	--	.40	.02	.42	.40	.76	--	--	--	--
SEP												
23...	9.6	353	327	.24	.01	.25	.24	.02	.45	.47	.72	3.2
NOV												
04 ···	--	--	--	.17	.01	.18	.17	.26	--	--	--	--

DATE	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)
NOV												
06...	.020	.01	--	--	--	--	--	--	--	--	--	--
JAN												
08...	.020	.01	--	--	--	--	--	--	--	--	--	--
MAR												
18...	.300	.10	.01	--	--	--	--	--	--	--	--	--
MAY												
06...	.010	.01	--	--	--	--	--	--	--	--	--	--
JUL												
09...	.070	.05	--	--	--	--	--	--	--	--	--	--
SEP												
23...	.060	.00	.00	2	0	10	0	0	0	1	20	<.1
NOV												
04 ···	.010	.01	--	--	--	--	--	--	--	--	--	--

04174050 HURON RIVER AT DELHI MILLS, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARRON, ORGANIC TOTAL (MG/L AS C)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)	NAPH-THA-LENES, POLY-CHLOR. TOTAL (UG/L)	PCB, TOTAL (UG/L)	ALDRIN, TOTAL (UG/L)	CHLOR-DANE, TOTAL (UG/L)	DDD, TOTAL (UG/L)	DDE, TOTAL (UG/L)
NOV 06...	--	--	--	6.8	.00	.00	.0	.00	.0	.00	.00
JAN 08...	--	--	--	6.4	<.10	.00	.0	.00	.0	.00	.00
MAR 18...	--	--	--	18	.00	.00	.0	.00	.0	.00	.00
MAY 06...	--	--	--	8.9	.00	.00	.0	.00	.0	.00	.00
JUL 09...	--	--	--	10	<.10	.00	.0	.00	.0	.00	.00
SEP 23...	0	0	0	10	<.10	.00	.0	.00	.0	.00	.00
NOV 04 ···	--	--	--	8.3	<.10	--	<.1	<.01	<.1	<.01	<.01

DATE	DDT, TOTAL (UG/L)	DI-AZINON, TOTAL (UG/L)	DI-ELDRIN TOTAL (UG/L)	ENDRIN, TOTAL (UG/L)	ETHION, TOTAL (UG/L)	HEPTA-CHLOR, TOTAL (UG/L)	HEPTA-CHLOR EPOXIDE TOTAL (UG/L)	LINDANE TOTAL (UG/L)	MALA-THION, TOTAL (UG/L)
NOV , 1979 06...	.00	.00	.00	.00	.00	.00	.00	.00	.00
JAN , 1980 08...	.00	.00	.00	.00	.00	.00	.00	.00	.00
MAR 18...	.00	.00	.00	.00	.00	.00	.00	.00	.00
MAY 06...	.00	.00	.00	.00	.00	.00	.00	.00	.00
JUL 09...	.00	.00	.00	.00	.00	.00	.00	.00	.00
SEP 23...	.00	.00	.00	.00	.00	.00	.00	.00	.00
NOV 04 ···	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DATE	METHYL PARA-THION, TOTAL (UG/L)	METHYL TRI-THION, TOTAL (UG/L)	PARA-THION, TOTAL (UG/L)	TOX-APHENE, TOTAL (UG/L)	TOTAL TRI-THION (UG/L)	2,4-D, TOTAL (UG/L)	2,4,5-T TOTAL (UG/L)	SILVEX, TOTAL (UG/L)
NOV , 1979 06...	.00	.00	.00	0	.00	.07	.00	.01
JAN , 1980 08...	.00	.00	.00	0	.00	.04	.00	.01
MAR 18...	.00	.00	.00	0	.00	--	--	--
MAY 06...	.00	.00	.00	0	.00	--	--	--
JUL 09...	.00	.00	.00	0	.00	.03	.00	.00
SEP 23...	.00	.00	.00	0	.00	.08	.00	.01
NOV 04 ···	<.01	<.01	<.01	<0.1	<.01	.06	.00	.00

04174500 HURON RIVER AT ANN ARBOR, MI

LOCATION.--Lat 42°17'10", long 83°44'00", in NW¼ sec.28, T.2 S., R.6 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 100 ft (30 m) upstream from bridge on Wall Street in Ann Arbor, 0.7 mi (1.1 km) downstream from Argo Dam, and 4.2 mi (6.8 km) upstream from Geddes Dam.

DRAINAGE AREA.--729 mi² (1,888 km²).

PERIOD OF RECORD.--February 1904 to current year. Monthly discharge only for some periods published in WSP 1307. Published as "at Geddes" February 1904 to December 1914 and as "at Barton" January 1914 to September 1940.

REVISED RECORDS.--WSP 874: 1938. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 744.81 ft (227.018 m) National Geodetic Vertical Datum of 1929 (levels by Michigan Department of Natural Resources). February 1904 to December 1914 at Geddes Dam, 4.2 mi (6.8 km) downstream, and January 1914 to September 1947, at Barton Dam, 2.6 mi (4.2 km) upstream, flow computed from records of operation of powerplants and records of depth of flow over dam and/or flow through undersluices.

REMARKS.--Records good. Diversion above station for Ann Arbor municipal supply had negligible effect on natural flow prior to 1955, figures of runoff adjusted since. Flow regulated by powerplants prior to May 1962. From June 1962 to 1975 occasional regulation for lake level control operations above station. Since 1975 extensive regulation of flow exists due to automation of gates at dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--76 years, 452 ft³/s (12.80 m³/s), 8.42 in/yr (214 mm/yr), adjusted for diversion since 1955.

EXTREMES FOR PERIOD OF RECORD.--Maximum daily discharge, 5,840 ft³/s (165 m³/s), Mar. 14, 1918; minimum daily, 4 ft³/s (0.11 m³/s) Aug. 2, Sept. 11, 1931 (plant leakage), but may be doubtful due to change in leakage.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,310 ft³/s (65.4 m³/s) Aug. 31, gage height, 15.08 ft (4.596 m); minimum daily discharge, 86 ft³/s (2.44 m³/s) Oct. 4.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	115	224	569	689	280	312	1080	968	563	240	208	660
2	100	200	470	654	276	280	1030	915	495	284	460	843
3	141	280	460	593	276	288	1110	831	850	260	654	707
4	86	347	485	599	268	276	1560	799	961	200	569	536
5	144	216	581	546	240	276	1710	593	719	260	395	536
6	132	429	546	470	248	264	1580	677	671	236	370	500
7	153	390	400	460	244	248	1410	671	799	260	385	490
8	171	260	395	419	232	264	1330	635	915	228	409	395
9	144	380	385	390	240	260	1400	541	831	240	439	465
10	162	405	405	385	232	292	1460	530	731	216	419	445
11	178	366	400	541	244	264	1390	495	683	216	370	419
12	186	541	414	460	228	256	1250	575	642	150	260	385
13	175	510	400	465	224	264	1290	599	605	208	288	409
14	186	182	385	475	240	280	1330	575	587	186	400	490
15	189	288	370	475	216	272	1460	525	889	182	375	460
16	147	284	380	470	228	375	1380	419	935	333	320	409
17	141	304	337	460	240	1340	1010	510	660	276	248	605
18	159	280	333	520	236	1290	1320	915	623	193	366	713
19	126	292	308	505	236	1110	1240	929	666	236	304	654
20	178	296	288	475	224	1290	1120	811	671	186	617	587
21	212	288	288	465	240	1290	1090	725	552	189	755	563
22	193	380	320	450	455	1270	1010	713	465	212	737	623
23	240	485	361	429	558	1180	975	677	439	189	617	683
24	248	500	599	370	455	1160	896	648	460	171	490	666
25	193	480	850	390	414	1200	876	605	405	98	414	695
26	165	569	975	337	347	1160	902	541	419	138	460	617
27	162	654	902	366	380	1040	856	424	400	165	385	599
28	162	635	843	356	351	975	915	304	356	186	385	587
29	171	581	768	328	316	975	623	375	171	312	385	558
30	156	563	725	312	---	995	761	500	280	220	505	575
31	189	---	695	308	---	1040	---	593	---	240	587	---
TOTAL	5104	11617	15637	14162	8368	21786	35364	19618	18443	6710	13576	16874
MEAN	165	387	504	457	289	703	1179	633	615	216	438	562
MAX	248	654	975	689	558	1340	1710	968	961	333	755	843
MIN	86	182	288	308	216	248	623	304	171	98	208	385
MEAN+	184	405	521	473	306	720	1196	652	635	242	458	582
CFSM+	.25	.56	.71	.65	.42	.99	1.64	.89	.87	.33	.63	.80
IN+	.29	.62	.82	.75	.45	1.14	1.83	1.03	.97	.38	.73	.89

CAL YR 1979 TOTAL 144805 MEAN 397 MAX 1430 MIN 55 MEAN+ 418 CFSM+ .57 IN+ 7.79
WTR YR 1980 TOTAL 187259 MEAN 512 MAX 1710 MIN 86 MEAN+ 531 CFSM+ .73 IN+ 9.91

04174800 HURON RIVER AT YPSILANTI, MI

LOCATION.--Lat 42°14'57", long 83°36'45", in SW¼ sec.4, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, on left bank 30 ft (9 m) downstream from bridge on Forest Avenue in Ypsilanti, 4.9 mi (7.9 km) downstream from Geddes Dam, 5.6 mi (9,0 km) upstream from Ford Dam, and at mile 42.8 (68.9 km).

DRAINAGE AREA.--807 mi² (2,090 km²).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--June 1974 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 700 ft (213 m) from topographic map (nearest 5 ft).

REMARKS.--Water-discharge records good. Considerable regulation caused by many dams above station; storage capacity is small.

AVERAGE DISCHARGE.--6 years, 555 ft³/s (15.72 m³/s), 9.34 in/yr (237 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 4,300 ft³/s (122 m³/s) Mar. 5, 1976, gage height, 12.50 ft (3.810 m); minimum daily, 64 ft³/s (1.81 m³/s) Sept. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 2,660 ft³/s (75.3 m³/s) Mar. 17, gage height, 11.22 ft (3.420 m); minimum daily, 142 ft³/s (4.02 m³/s) Oct. 5; minimum gage height, 6.44 ft (1.963 m) Nov. 16.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	165	254	605	749	305	335	1190	1010	714	309	213	805
2	160	242	560	720	302	322	1130	953	560	308	715	1030
3	181	275	528	663	306	331	1220	869	1000	322	791	832
4	145	367	532	631	308	317	1980	817	1100	248	629	583
5	142	263	629	603	286	323	1830	625	832	306	446	599
6	232	450	644	498	297	301	1650	722	718	310	393	570
7	174	377	499	534	286	282	1470	691	972	283	403	521
8	217	291	466	477	273	314	1420	651	1030	286	401	461
9	213	401	463	416	277	288	1500	548	921	290	422	604
10	211	399	447	413	276	373	1560	571	801	270	473	535
11	221	364	441	553	270	339	1480	504	739	251	406	464
12	244	634	440	528	247	299	1350	582	710	219	278	442
13	218	620	437	522	263	327	1330	618	665	253	298	578
14	194	300	416	520	273	317	1560	597	629	217	422	589
15	205	250	416	492	257	340	1690	523	1080	222	379	531
16	219	274	402	528	266	521	1520	458	1080	563	330	512
17	167	349	364	546	242	1940	1110	536	817	279	241	774
18	166	347	350	603	251	1560	1360	1070	665	268	355	825
19	199	361	363	577	277	1240	1300	999	734	239	342	736
20	176	352	352	556	262	1370	1180	850	695	272	807	694
21	180	368	329	525	272	1570	1140	796	609	229	775	635
22	207	440	393	516	722	1420	1070	735	528	251	763	779
23	241	615	439	485	698	1290	1020	720	477	237	699	828
24	266	688	745	421	530	1280	943	698	474	223	486	791
25	214	569	1110	445	488	1340	921	618	464	160	464	780
26	187	719	1140	392	398	1250	930	607	442	152	453	753
27	170	746	1000	415	436	1120	885	462	422	182	497	707
28	208	762	925	394	405	1050	994	366	392	325	426	680
29	194	677	856	380	336	1100	737	384	272	425	429	642
30	206	635	809	353	---	1090	886	588	240	292	503	629
31	210	---	767	344	---	1230	---	673	---	219	718	---
TOTAL	6132	13389	17907	15799	9809	25179	38276	20841	20782	8410	14957	19909
MEAN	198	446	578	510	338	812	1276	672	693	271	482	664
MAX	266	762	1140	749	722	1940	1980	1070	1100	563	807	1030
MIN	142	242	329	344	242	282	737	366	240	152	213	442
CFSM	.25	.55	.72	.63	.42	1.01	1.58	.83	.86	.34	.60	.82
IN.	.28	.62	.83	.73	.45	1.16	1.76	.96	.96	.39	.69	.92

CAL YR 1979 TOTAL 169614 MEAN 465 MAX 1990 MIN 99 CFSM .58 IN 7.82
WTR YR 1980 TOTAL 211390 MEAN 578 MAX 1980 MIN 142 CFSM .72 IN 9.74

04174800 HURON RIVER AT YPSILANTI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV 05...	1245	236	650	8.3	10.5	8.5	12.4	108	6.0	110	<10	--
JAN 07...	1130	495	650	7.2	-7.0	.5	13.9	99	5.9	50	<10	--
MAR 17...	1050	3360	601	7.7	16.0	1.5	13.6	101	10	770	<10	210
MAY 05...	1030	960	530	7.8	24.0	16.0	9.4	99	2.6	150	<30	--
JUL 09...	1020	100	580	7.8	21.0	25.0	7.2	88	2.2	390	90	--
SEP 22...	1315	675	600	8.0	25.5	20.5	8.5	100	1.7	640	70	290
NOV 03...	1130	472	600	8.1	15.5	8.0	12.8	89	3.3	30	<30	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV 05...	--	--	--	--	--	250	0	200	2.0	--	--	--
JAN 07...	--	--	--	--	--	240	0	200	24	--	--	--
MAR 17...	55	58	16	43	3.5	190	0	160	6.1	46	70	.2
MAY 05...	--	--	--	--	--	250	0	200	6.3	--	--	--
JUL 09...	--	--	--	--	--	250	0	200	17	--	--	--
SEP 22...	70	82	21	23	3.1	270	0	220	4.1	51	48	.3
NOV 03...	--	--	--	--	--	270	0	220	3.4	--	--	--

04174800 HURON RIVER AT YPSILANTI, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)
NOV												
05...	--	--	--	--	.93	.040	.97	.93	.640	--	--	--
JAN												
07...	--	--	--	--	1.6	.060	1.7	1.6	.520	--	--	--
MAR												
17...	4.9	364	338	3300	.69	.060	.75	.69	.290	1.5	1.8	2.6
MAY												
05...	--	--	--	--	1.1	.020	1.1	1.1	.760	--	--	--
JUL												
09...	--	--	--	--	1.3	.080	1.4	1.3	.900	--	--	--
SEP												
22...	10	394	374	718	.61	.170	.78	.61	.160	.63	.79	1.6
NOV												
03...	--	--	--	--	.63	.010	.64	.63	.220	--	--	--

DATE	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	COBALT, DIS-SOLVED (UG/L AS CO)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV												
05...	--	.020	.020	--	--	--	--	--	--	--	--	.00
JAN												
07...	--	.010	.010	--	--	--	--	--	--	--	--	<.10
MAR												
17...	11	.310	.020	.020	--	--	--	--	--	--	--	.00
MAY												
05...	--	.050	.010	--	--	--	--	--	--	--	--	.50
JUL												
09...	--	.070	.070	--	--	--	--	--	--	--	--	<.10
SEP												
22...	7.0	.080	.020	.000	2	0	0	0	0	30	<.1	<.10
NOV												
03...	--	.030	.030	--	--	--	--	--	--	--	--	<.10

04174900 FORD LAKE NEAR RAWSONVILLE, MI

LOCATION.--Lat 42°12'22", long 83°33'28", in SW¼ sec.24, T.3 S., R.7 E., Washtenaw County, Hydrologic Unit 04090005, at upstream side of Ford Dam at Rawsonville Road, 1 mi (1.6 km) west of Rawsonville, 3.0 mi (4.8 km) upstream from Belleville Dam, 3.5 mi (5.6 km) southeast of Ypsilanti, 4.2 mi (6.8 km) downstream from gaging station at Ypsilanti, and 37.4 mi (60.2 km) upstream from mouth.

DRAINAGE AREA.--814 mi^2 (2,110 km^2).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	SPECIFIC CONDUCTANCE (MICROMHOS)	PH FIELD (UNITS)	TEMPERATURE, AIR (DEG C)	TEMPERATURE, WATER (DEG C)	OXYGEN, DISSOLVED (MG/L)	OXYGEN, DISSOLVED (PERCENT SATURATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLIFORM, COMPLETE (MPN)	COLIFORM, FECAL, EC BROTH (MPN)	HARDNESS (MG/L AS CACO3)
NOV 05...	1420	695	8.4	12.0	6.5	9.4	82	5.7	80	<10	--
JAN 07...	1220	625	7.8	-6.0	.5	13.7	99	4.3	20	<10	--
MAR 17...	1330	680	7.8	9.0	2.5	13.2	96	6.8	<10	<10	270
MAY 05...	1230	565	8.1	25.5	18.0	13.8	69	4.9	30	<30	--
JUL 09...	1100	550	8.1	19.5	25.5	8.2	100	1.0	200	<30	--
SEP 22...	1510	580	8.3	30.5	22.5	8.4	99	3.8	70	<30	260
NOV 03...	1250	600	8.0	21.5	10.0	9.4	82	2.0	40	<30	--

DATE	HARDNESS, NONCARBONATE (MG/L CACO3)	CALCIUM DISSOLVED (MG/L AS CA)	MAGNESIUM, DISSOLVED (MG/L AS MG)	SODIUM, DISSOLVED (MG/L AS NA)	POTASSIUM, DISSOLVED (MG/L AS K)	BICARBONATE (MG/L AS HCO3)	CARBONATE (MG/L AS CO3)	ALKALINITY (MG/L AS CACO3)	CARBON DIOXIDE DISSOLVED (MG/L AS CO2)	SULFATE DISSOLVED (MG/L AS SO4)
NOV 05...	--	--	--	--	--	220	4	190	1.5	--
JAN 07...	--	--	--	--	--	230	0	190	5.8	--
MAR 17...	77	75	21	39	3.4	240	0	200	6.1	64
MAY 05...	--	--	--	--	--	230	0	190	2.9	--
JUL 09...	--	--	--	--	--	240	0	200	3.1	--
SEP 22...	68	68	21	24	2.9	230	0	190	1.8	51
NOV 03...	--	--	--	--	--	260	0	210	4.2	--

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	NITROGEN, NITRATE TOTAL (MG/L AS N)	NITROGEN, NITRITE TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)
NOV 05...	--	--	--	--	--	1.1	.03	1.1	1.1	1.1
JAN 07...	--	--	--	--	--	.10	.04	.14	.10	.57
MAR 17...	67	.3	6.2	423	398	.90	.08	.98	.90	.48
MAY 05...	--	--	--	--	--	.56	.03	.59	.56	.76
JUL 09...	--	--	--	--	--	.56	.40	.96	.56	.96
SEP 22...	50	.3	7.7	377	340	.46	.04	.50	.46	.34
NOV 03...	--	--	--	--	--	.84	.01	.85	.84	.60

04174900 FORD LAKE NEAR RAWSONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)
NOV 05...	--	--	--	--	.010	.01	--	--	--	--
JAN 07...	--	--	--	--	.050	.05	--	--	--	--
MAR 17...	.92	1.4	2.4	11	.050	.01	.01	--	--	--
MAY 05...	--	--	--	--	.030	.00	--	--	--	--
JUL 09...	--	--	--	--	.050	.02	--	--	--	--
SEP 22...	.76	1.1	1.6	7.1	.060	.01	.00	2	0	10
NOV 03...	--	--	--	--	.030	.02	--	--	--	--

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	ZINC, DIS-SOLVED (UG/L AS ZN)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 05...	--	--	--	--	--	--	--	--	--	.00
JAN 07...	--	--	--	--	--	--	--	--	--	<.10
MAR 17...	--	--	--	--	--	--	--	--	--	.00
MAY 05...	--	--	--	--	--	--	--	--	--	.00
JUL 09...	--	--	--	--	--	--	--	--	--	<.10
SEP 22...	0	0	0	0	10	<.1	9	0	10	<.10
NOV 03...	--	--	--	--	--	--	--	--	--	<.10

04175340 STONY CREEK AT OAKVILLE, MI

LOCATION.--Lat 42°05'05", long 83°34'43", in SE¼ SE¼ sec.34, T.4 S., R.7 E., Washtenaw County, Hydrologic Unit 04100001, on left bank at downstream side of bridge on Tuttle Hill Road, 300 ft (91 m) downstream from Paint Creek, and 0.2 mi (0.3 km) northeast of Oakville.

DRAINAGE AREA.--68.0 mi² (176.1 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 645 ft (197 m) from topographic map (nearest 5 ft). Prior to July 31, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 45.9 ft³/s (1.300 m³/s), 9.17 in/yr (233 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 860 ft³/s (24.4 m³/s) Mar. 21, 1978, gage height, 8.24 ft (2.512 m); maximum gage height, 8.31 ft (2.533 m) Feb. 20, 1971, backwater from ice; minimum discharge, 2.7 ft³/s (0.076 m³/s) Aug. 24, 1971, gage height, 1.00 ft (0.305 m).

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 300 ft³/s (8.50 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	1900	582	16.5	7.63	2.326	Apr. 4	1200	626	17.7	7.74	2.359
Feb. 23	0100	351	9.94	6.88	2.097	Apr. 15	0200	582	16.5	7.63	2.326
Mar. 17	2100	713	20.2	7.94	2.420	May 18	1800	333	9.43	6.78	2.067
Mar. 22	0200	538	15.2	7.52	2.292	June 3	1800	*755	21.4	*8.03	2.448
Mar. 25	1000	306	8.67	6.61	2.015	June 8	0800	320	9.06	6.70	2.042
Mar. 31	2200	326	9.23	6.74	2.054						

Minimum discharge, 6.7 ft³/s (0.19 m³/s) Oct. 1; minimum gage height, 1.45 ft (0.442 m) July 25, 27.

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	6.9	15	52	50	17	27	224	81	29	17	18	94
2	7.3	18	42	53	16	25	149	66	65	16	62	70
3	7.9	15	38	48	16	23	136	56	442	15	200	47
4	8.9	14	34	43	15	21	502	47	495	14	100	32
5	8.9	14	34	38	15	22	384	40	158	18	48	27
6	10	15	44	35	15	21	182	35	99	22	30	23
7	15	14	42	32	15	19	131	32	112	16	25	20
8	11	13	39	31	15	18	120	29	258	14	20	19
9	10	13	32	27	14	19	214	28	112	13	18	26
10	9.8	21	30	25	14	20	231	27	74	15	18	49
11	10	17	32	48	14	34	153	33	54	14	24	26
12	13	14	32	62	14	30	141	33	43	12	27	21
13	14	13	31	48	14	28	114	38	36	13	22	24
14	13	13	27	38	14	27	223	64	33	12	21	42
15	11	13	27	34	14	30	530	45	56	11	20	28
16	11	15	24	35	14	100	303	36	248	12	16	24
17	11	14	22	50	14	460	151	36	137	23	15	34
18	11	13	21	59	14	566	114	255	70	13	17	43
19	11	12	21	52	14	217	95	172	54	10	15	27
20	13	12	21	44	15	139	79	96	57	11	63	22
21	14	12	20	38	15	312	68	66	42	10	88	19
22	13	15	26	33	160	410	61	50	34	11	139	17
23	14	35	60	30	255	171	54	40	28	10	53	25
24	16	85	168	28	95	146	48	36	29	8.6	32	20
25	15	71	538	25	61	255	59	34	25	8.2	25	17
26	15	138	442	24	46	142	53	27	22	8.8	21	19
27	16	117	147	22	38	116	48	25	19	8.8	19	18
28	16	126	116	21	34	113	106	24	18	28	17	16
29	17	124	92	19	30	164	99	22	17	40	17	15
30	15	71	78	19	---	160	98	24	16	50	16	14
31	14	---	67	18	---	243	---	34	---	34	17	---
TOTAL	378.7	1082	2439	1139	1027	4078	4874	1631	2882	508.4	1223	878
MEAN	12.2	36.1	78.7	36.7	35.4	132	162	52.6	96.1	16.4	39.5	29.3
MAX	17	138	538	62	255	566	530	255	495	50	200	94
MIN	6.9	12	20	18	14	18	48	22	16	8.2	15	14
CFSM	.18	.53	1.16	.54	.52	1.94	2.38	.77	1.41	.24	.58	.43
IN.	.21	.59	1.33	.62	.56	2.23	2.67	.89	1.58	.28	.67	.48

CAL YR 1979 TOTAL 16301.9 MEAN 44.7 MAX 679 MIN 5.7 CFSM .66 IN 8.92
WTR YR 1980 TOTAL 22140.1 MEAN 60.5 MAX 566 MIN 6.9 CFSM .89 IN 12.11

04175597 RIVER RAISIN NEAR SHARONVILLE, MI

LOCATION.--Lat 42°10'04", long 84°07'21", in SW¼ sec.31, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Sharon Valley Road, 2.0 mi (3.2 km) southwest of Sharonville, 4.0 mi (6.4 km) upstream from gaging station near Manchester, 4.0 mi (6.4 km) northwest of Manchester, and 113 mi (182 km) upstream from mouth.

DRAINAGE AREA.--121 mi² (313 km²).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

REMARKS.--Estimates of water discharge are based on streamflow records at gaging station near Manchester.

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)	HARD-NESS (MG/L AS CACO3)
NOV												
06...	1515	30	560	8.3	7.5	4.5	10.8	86	2.2	110	<10	--
JAN												
09...	1000	E89	490	7.8	-4.5	.0	13.6	99	3.6	20	<10	--
MAR												
19...	1255	E260	325	7.1	10.5	2.0	11.5	82	6.4	880	<10	150
MAY												
07...	1230	E120	450	8.2	13.0	15.5	8.8	81	2.8	110	70	--
JUL												
11...	1130	79	450	7.7	27.5	25.5	6.9	84	1.5	640	120	--
SEP												
24...	1145	E120	460	8.0	15.5	17.0	8.0	79	.9	640	280	240
NOV												
04...	1510	E72	480	7.8	9.0	9.5	11.2	100	1.8	90	40	--

DATE	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)
NOV												
06...	--	--	--	--	--	270	0	220	2.2	--	--	--
JAN												
09...	--	--	--	--	--	250	0	200	6.3	--	--	--
MAR												
19...	19	42	10	13	5.2	160	0	130	20	31	27	.2
MAY												
07...	--	--	--	--	--	250	0	200	2.5	--	--	--
JUL												
11...	--	--	--	--	--	260	0	210	8.3	--	--	--
SEP												
24...	38	64	19	10	1.9	250	0	200	3.9	19	21	.2
NOV												
04...	--	--	--	--	--	270	0	220	6.8	--	--	--

04175597 RIVER RAISIN NEAR SHARONVILLE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)
NOV 06...	--	--	--	.61	.010	.62	.61	.390	--	--	--	--
JAN 09...	--	--	--	.75	.020	.77	.75	.490	--	--	--	--
MAR 19...	5.6	292	218	2.0	.040	2.0	2.0	.380	1.3	1.7	3.7	16
MAY 07...	--	--	--	.59	.010	.60	.59	.380	--	--	--	--
JUL 11...	--	--	--	.17	.030	.20	.17	.980	--	--	--	--
SEP 24...	8.4	315	269	.54	.010	.55	.44	.010	.62	.63	1.2	5.2
NOV 04...	--	--	--	.73	.000	.73	.73	.160	--	--	--	--

DATE	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV 06...	.010	.000	--	--	--	--	--	--	--	--	.00
JAN 09...	.010	.010	--	--	--	--	--	--	--	--	<.10
MAR 19...	.140	.050	.000	--	--	--	--	--	--	--	.00
MAY 07...	.040	.000	--	--	--	--	--	--	--	--	.00
JUL 11...	.020	.020	--	--	--	--	--	--	--	--	<.10
SEP 24...	.030	.010	.000	2	2	0	30	0	20	<.1	<.10
NOV 04...	.020	.020	--	--	--	--	--	--	--	--	<.10

04175600 RIVER RAISIN NEAR MANCHESTER, MI

LOCATION.--Lat 42°10'05", long 84°04'34", in NE¼ SE¼ sec.33, T.3 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, on left bank 8 ft (2 m) downstream from bridge on Sharon Valley Road, and 2.5 mi (4.0 km) northwest of Manchester.

DRAINAGE AREA.--132 mi² (342 km²).

PERIOD OF RECORD.--January 1970 to current year.

GAGE.--Water-stage recorder. Altitude of gage is 900 ft (274 m) from topographic map (nearest 10 ft). Prior to July 30, 1970, nonrecording gage at same site and datum.

REMARKS.--Records good except those for the winter period, which are fair. Occasional regulation by many dams above station. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--10 years, 101 ft³/s (2.860 m³/s), 10.39 in/yr (264 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 565 ft³/s (16.0 m³/s) Mar. 5, 1976, gage height, 6.46 ft (1.969 m); minimum, 4.5 ft³/s (0.13 m³/s) Nov. 29, 1971; minimum gage height, 1.16 ft (0.354 m) Oct. 12, Nov. 4, 1978.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 280 ft³/s (7.93 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Mar. 18	0100	330	9.35	5.17	1.576	June 5	1700	295	8.35	5.01	1.527
Apr. 8	2000	*349	9.88	*5.27	1.606						

Minimum discharge, 9.4 ft³/s (0.27 m³/s) Oct. 28, gage height, 1.34 ft (0.408 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	15	27	123	151	61	85	270	207	51	55	46	146
2	16	37	109	145	60	82	260	194	60	65	88	185
3	17	40	100	135	59	76	257	179	207	61	190	175
4	18	36	118	130	58	70	322	166	255	56	191	161
5	18	33	94	120	57	64	332	143	277	58	167	147
6	19	35	105	115	56	53	312	136	258	66	145	129
7	22	33	101	110	55	53	302	127	239	64	129	115
8	21	35	98	100	55	57	334	116	262	76	114	79
9	21	40	89	97	54	61	327	107	252	64	102	88
10	21	39	84	95	54	67	320	100	235	71	94	97
11	22	41	81	130	54	80	306	108	210	72	93	96
12	26	42	86	145	53	75	291	110	194	71	98	74
13	28	36	85	140	53	74	276	117	179	69	99	85
14	26	37	78	130	53	68	270	125	177	65	105	102
15	24	39	72	115	53	68	295	118	201	61	113	91
16	24	37	69	110	52	85	293	110	249	63	110	87
17	24	38	67	120	52	243	284	112	222	72	103	117
18	24	41	64	118	52	304	267	179	201	71	99	143
19	29	39	61	110	52	280	244	196	184	69	93	131
20	30	38	58	101	52	258	232	182	172	65	124	117
21	29	42	56	95	52	260	222	162	158	58	152	106
22	28	49	62	88	129	274	216	152	146	57	148	104
23	33	82	89	84	167	271	206	141	129	54	142	132
24	37	118	139	83	134	266	194	122	120	50	130	128
25	34	121	230	79	115	277	203	98	114	46	116	116
26	31	146	244	76	105	266	202	90	100	41	105	114
27	30	160	230	72	97	259	191	84	95	38	100	105
28	20	156	208	69	92	254	200	105	87	49	94	93
29	30	152	189	67	89	259	209	121	81	62	88	83
30	27	139	173	65	---	270	214	117	68	54	83	76
31	24	---	161	63	---	273	---	118	---	49	91	---
TOTAL	768	1908	3523	3258	2075	5132	7851	4142	5183	1872	3552	3422
MEAN	24.8	63.6	114	105	71.6	166	262	134	173	60.4	115	114
MAX	37	160	244	151	167	304	334	207	277	76	191	185
MIN	15	27	56	63	52	53	191	84	51	38	46	74
CFSM	.19	.48	.86	.80	.54	1.26	1.99	1.02	1.31	.46	.87	.86
IN.	.22	.54	.99	.92	.58	1.45	2.21	1.17	1.46	.53	1.00	.96

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CAL YR 1979  TOTAL  33566.0  MEAN  92.0  MAX 393  MIN  7.0  CFSM .70  IN  9.46
WTR YR 1980  TOTAL  42686.0  MEAN 117    MAX 334  MIN 15    CFSM .89  IN 12.03
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04175610 RIVER RAISIN AT MANCHESTER, MI

LOCATION.--Lat 42°08'52", long 84°00'56", in SE¼ sec.1, T.4 S., R.3 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Austin Road, 1.0 mi (1.6 km) east of Manchester, 0.6 mi (1.0 km) downstream from Ford Dam, 5.3 mi (8.5 km) downstream from gaging station near Manchester, and 104 mi (167 km) upstream from mouth.

DRAINAGE AREA.--148 mi² (383 km²).

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH FIELD (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE, WATER (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CACO3)
NOV 07...	0930	11.74	560	8.0	3.0	6.0	11.4	92	3.0	750	80	--
JAN 09...	1040	11.07	470	7.9	-4.5	.0	13.3	96	2.6	1120	<10	--
MAR 20...	1010	9.70	453	7.7	10.5	3.0	12.2	92	5.5	1300	950	220
MAY 07...	1330	10.66	520	8.1	13.5	17.0	9.5	88	2.4	200	<30	--
JUL 11...	1230	11.13	460	7.9	30.0	25.0	7.8	95	7.2	2800	640	--
SEP 24...	1345	10.60	470	7.9	20.5	18.5	9.0	89	3.3	2100	1500	250
NOV 05...	0845	11.18	475	8.0	2.5	8.5	12.4	92	2.0	930	240	--

DATE	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 07...	--	--	--	--	--	290	0	240	4.6	--	--	--
JAN 09...	--	--	--	--	--	260	0	210	5.2	--	--	--
MAR 20...	93	65	15	7.1	4.3	160	0	130	5.1	73	20	.2
MAY 07...	--	--	--	--	--	260	0	210	3.3	--	--	--
JUL 11...	--	--	--	--	--	250	0	200	5.0	--	--	--
SEP 24...	37	67	19	10	2.2	260	0	210	5.2	18	21	.2
NOV 05...	--	--	--	--	--	290	0	240	4.6	--	--	--

04175610 RIVER RAISIN AT MANCHESTER, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)
NOV 07...	--	--	--	.58	.02	.60	.58	.53	--	--	--	--
JAN 09...	--	--	--	1.4	.02	1.4	1.4	.43	--	--	--	--
MAR 20...	5.2	324	287	3.7	.06	3.8	3.7	.34	1.2	1.5	5.3	23
MAY 07...	--	--	--	.36	.01	.37	.36	.44	--	--	--	--
JUL 11...	--	--	--	.15	.04	.19	.15	1.1	--	--	--	--
SEP 24...	9.7	328	278	.50	.03	.53	.57	.05	.61	.66	1.2	5.3
NOV 05...	--	--	--	.43	.01	.44	.43	.18	--	--	--	--

DATE	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	COBALT, DIS-SOLVED (UG/L AS CO)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 07...	.070	.04	--	--	--	--	--	--	--	--	.00
JAN 09...	.030	.03	--	--	--	--	--	--	--	--	<.10
MAR 20...	.200	.02	.00	--	--	--	--	--	--	--	.00
MAY 07...	.030	.01	--	--	--	--	--	--	--	--	.00
JUL 11...	.050	.03	--	--	--	--	--	--	--	--	<.10
SEP 24...	.040	.01	.00	1	2	0	30	0	20	<.1	<.10
NOV 05...	.020	.01	--	--	--	--	--	--	--	--	<.10

04175700 RIVER RAISIN NEAR TECUMSEH, MI

LOCATION.--Lat 41°56'35", long 83°56'45", in NE¼ sec.21, T.6 S., R.4 E., Lenawee County, Hydrologic Unit 04100002, on right bank 12 ft (4 m) downstream from former bridge site on North Raisin Center Highway, 3.4 mi (5.5 km) upstream from South Branch River Raisin, and 4.5 mi (7.2 km) south of Tecumseh.

DRAINAGE AREA.--267 mi² (692 km²).

PERIOD OF RECORD.--September 1956 to September 1980 (discontinued as a continuous-record station; converted to a crest-stage partial-record station).

REVISED RECORDS.--WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 707.0 ft (215.49 m) National Geodetic Vertical Datum of 1929.

REMARKS.--Records good except those for the winter period and those for period of no gage-height record, July 23 to Sept. 30, which are fair. Diurnal fluctuation caused by powerplant 5.5 mi (8.8 km) above station prior to June 27, 1968. Several observations of water temperature were made during the year.

AVERAGE DISCHARGE.--24 years, 182 ft³/s (5.154 m³/s), 9.26 in/yr (235 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 2,920 ft³/s (82.7 m³/s) June 26, 1968, gage height, 12.66 ft (3.859 m); minimum, 6.4 ft³/s (0.18 m³/s) Aug. 26, 1964, gage height, 2.57 ft (0.783 m); minimum daily, 8.3 ft³/s (0.24 m³/s) Oct. 30, 1965.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 700 ft³/s (19.8 m³/s) and maximum (*):

Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft³/s)	Discharge (m³/s)	Gage height (ft)	Gage height (m)
Dec. 25	2300	832	23.6	9.23	2.813	Apr. 4	1900	1020	28.9	9.66	2.944
Mar. 18	0400	*1300	36.8	*10.21	3.112	Apr. 15	1100	720	20.4	8.95	2.728
Mar. 22	0700	0764	21.6	9.06	2.761	June 4	0100	1280	36.2	10.19	3.106

Minimum discharge, 42 ft³/s (1.19 m³/s) Oct. 1, gage height, 3.85 ft (1.173 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	44	78	223	267	125	178	512	345	227	135	120	320
2	46	86	199	228	125	176	478	341	306	154	240	390
3	49	89	181	215	120	164	461	325	776	124	400	360
4	49	84	157	200	120	153	744	300	995	127	400	320
5	52	87	169	190	120	142	829	265	658	152	340	290
6	60	86	169	185	115	109	654	206	545	162	290	260
7	72	88	169	175	115	106	591	210	509	138	260	220
8	72	85	173	170	115	110	539	216	653	133	230	170
9	65	124	163	165	115	119	584	203	580	133	210	190
10	71	101	154	190	110	131	671	195	473	138	200	205
11	81	102	150	214	110	163	639	195	396	133	195	200
12	93	96	148	235	110	165	579	196	337	129	205	160
13	92	95	150	239	110	146	539	204	321	128	210	195
14	65	90	151	191	110	141	533	226	294	113	220	210
15	54	91	142	194	110	143	694	221	292	115	230	190
16	58	93	134	173	110	202	645	208	347	135	220	200
17	73	86	129	177	110	713	550	212	414	132	210	260
18	74	86	120	198	110	1130	491	420	379	125	200	290
19	64	88	124	203	110	783	455	503	329	121	210	260
20	61	90	122	193	110	609	417	369	301	116	260	235
21	59	91	116	180	110	620	379	337	271	113	315	220
22	71	92	116	171	230	718	352	290	245	112	305	220
23	117	116	139	165	509	564	336	228	224	105	290	270
24	103	193	229	158	388	499	316	225	209	98	260	250
25	81	220	649	150	273	581	331	220	180	90	245	235
26	80	264	748	145	216	519	329	199	166	80	225	225
27	79	293	583	145	204	459	320	184	154	90	210	205
28	79	306	479	140	179	426	353	166	144	110	195	180
29	76	312	398	135	166	446	387	163	149	125	185	160
30	72	257	336	130	---	477	364	182	141	110	180	170
31	74	---	295	130	---	490	---	217	---	100	210	---
TOTAL	2185	3969	7215	5641	4555	11382	15112	7771	11015	3776	7470	7060
MEAN	70.5	132	233	182	157	367	504	251	367	122	241	235
MAX	117	312	748	267	509	1130	829	503	995	162	400	390
MIN	44	78	116	130	110	106	316	163	141	80	120	160
CFSM	.26	.49	.87	.68	.59	1.38	1.89	.94	1.38	.46	.90	.88
IN.	.30	.55	1.01	.79	.63	1.59	2.11	1.08	1.53	.53	1.04	.98

CAL YR 1979 TOTAL 66952 MEAN 183 MAX 1170 MIN 32 CFSM .69 IN 9.33
WTR YR 1980 TOTAL 87151 MEAN 238 MAX 1130 MIN 44 CFSM .89 IN 12.14

04176365 SALINE RIVER ABOVE SALINE, MI

LOCATION.--Lat 42°10'16", long 83°49'32", in SW¼ sec.34, T.3 S., R.5 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Dell Road, 2.5 mi (4.0 km) east of Saline, 6.9 mi (11.1 km) upstream from gaging station near Saline, 33 mi (53 km) upstream from River Raisin.

DRAINAGE AREA.--46 mi^2 (119 km^2), approximately.

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH FIELD (UNITS)	TEMPER- ATURE, AIR (DEG C)	TEMPER- ATURE, WATER (DEG C)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI- FORM, COM- PLETE (MPN)	COLI- FORM, FECAL, EC BROTH (MPN)	HARD- NESS (MG/L AS CACO3)
NOV 07...	1040	9.37	825	8.0	3.5	5.5	9.6	77	3.0	710	30	--
JAN 07...	1510	9.37	770	7.0	-4.5	.5	13.4	97	3.1	1080	<10	--
MAR 20...	0830	8.24	450	7.5	5.0	3.0	11.3	86	4.6	780	<10	160
MAY 05...	1530	9.32	800	7.7	29.5	18.5	10.6	90	.4	390	40	--
JUL 09...	1420	9.65	745	7.6	19.5	17.5	8.2	100	.3	2000	1100	--
SEP 24...	1500	9.50	745	7.9	18.0	14.0	9.5	94	2.6	2400	2000	410
NOV 03...	1500	9.43	750	7.9	20.0	11.0	12.2	93	2.4	140	40	--

DATE	HARD- NFSS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
NOV 07...	--	--	--	--	--	350	0	290	5.6	--	--	--
JAN 07...	--	--	--	--	--	280	0	230	45	--	--	--
MAR 20...	36	44	12	7.8	3.2	150	0	120	7.6	25	15	.2
MAY 05...	--	--	--	--	--	290	0	240	9.3	--	--	--
JUL 09...	--	--	--	--	--	340	0	280	14	--	--	--
SEP 24...	140	120	26	10	4.0	340	0	270	6.6	100	28	.3
NOV 03...	--	--	--	--	--	360	0	300	7.3	--	--	--

04176365 SALINE RIVER ABOVE SALINE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	NITRO- GEN, NITRATE TOTAL (MG/L AS N)	NITRO- GEN, NITRITE TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)	NITRO- GEN, ORGANIC TOTAL (MG/L AS N)	NITRO- GEN,AM- MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS N)	NITRO- GEN, TOTAL (MG/L AS NO3)
NOV												
07...	--	--	--	.55	.000	.55	.55	.340	--	--	--	--
JAN												
07...	--	--	--	2.3	.020	2.3	2.3	.640	--	--	--	--
MAR												
20...	5.2	--	191	1.1	.040	1.1	1.1	.290	.68	.97	2.1	9.2
MAY												
05...	--	--	--	1.6	.020	1.6	1.6	.650	--	--	--	--
JUL												
09...	--	--	--	1.2	.020	1.2	1.2	.420	--	--	--	--
SEP												
24...	12	571	469	1.4	.040	1.4	1.4	.020	.91	.93	2.3	10
NOV												
03...	--	--	--	.43	.01	.44	.43	.20	--	--	--	--

DATE	PHOS- PHORUS, TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS- PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS- SOLVED (UG/L AS AS)	CADMIUM DIS- SOLVED (UG/L AS CD)	COBALT, DIS- SOLVED (UG/L AS CO)	IRON, DIS- SOLVED (UG/L AS FE)	LEAD, DIS- SOLVED (UG/L AS PB)	MANGA- NESE, DIS- SOLVED (UG/L AS MN)	MERCURY DIS- SOLVED (UG/L AS HG)	METHY- LENE BLUE ACTIVE SUB- STANCE (MG/L)
NOV											
07...	.020	.010	--	--	--	--	--	--	--	--	.00
JAN											
07...	.050	.030	--	--	--	--	--	--	--	--	.00
MAR											
20...	.060	.000	.000	--	--	--	--	--	--	--	.00
MAY											
05...	.040	.030	--	--	--	--	--	--	--	--	.00
JUL											
09...	.060	.050	--	--	--	--	--	--	--	--	<.10
SEP											
24...	.060	.030	.010	1	1	0	40	0	80	<.1	<.10
NOV											
03...	.030	.02	--	--	--	--	--	--	--	--	<.10

04176418 SALINE RIVER ABOVE MILAN, MI

LOCATION.--Lat 42°05'02", long 83°41'45", in SE¼ sec.34, T.4 S., R.6 E., Washtenaw County, Hydrologic Unit 04100002, at bridge on Platt Road, at Milan, 0.7 mi (1.1 km) upstream from dam at Milan, 9.9 mi (15.9 km) downstream from gaging station near Saline, and 16.2 mi (26.1 km) upstream from River Raisin.

DRAINAGE AREA.--112 mi² (290 km²), approximately.

PERIOD OF RECORD.--Water years 1971 to November 1980 (discontinued).

COOPERATION.--Bimonthly samples were collected by the U.S. Geological Survey and were analyzed for nutrients, coliforms, and BOD by Canton Analytical Laboratory, Washtenaw County.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980

DATE	TIME	STREAM STAGE (FT ABOVE DATUM)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	OXYGEN DEMAND, BIOCHEM UNINHIB 5 DAY (MG/L)	COLI-FORM, COM-PLETE (MPN)	COLI-FORM, FECAL, EC BROTH (MPN)
NOV 07...	1140	15.16	1000	8.0	3.0	6.0	9.6	77	2.3	640	<10
JAN 07...	1410	15.00	845	7.5	-4.5	.5	13.2	96	4.3	830	130
MAR 17...	1515	13.65	296	7.4	6.0	2.0	12.0	86	12	2050	<10
MAY 05...	1415	14.85	795	7.8	29.5	18.0	8.6	91	1.6	930	<30
JUL 09...	1300	15.19	750	7.7	21.0	22.5	6.4	78	1.7	4300	2400
SEP 25...	0845	14.88	760	8.0	14.5	16.0	5.7	60	1.5	1200	640
NOV 03...	1400	15.15	900	7.8	21.5	8.0	9.1	80	2.1	200	<30

DATE	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
NOV 07...	--	--	--	--	--	--	320	0	260	5.1	--
JAN 07...	--	--	--	--	--	--	290	0	240	15	--
MAR 17...	120	42	35	8.5	10	6.5	98	0	80	6.2	33
MAY 05...	--	--	--	--	--	--	290	0	240	7.4	--
JUL 09...	--	--	--	--	--	--	310	0	250	9.9	--
SEP 25...	380	120	110	25	30	13	330	0	260	5.1	120
NOV 03...	--	--	--	--	--	--	350	0	290	8.9	--

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)
NOV 07...	--	--	--	--	--	2.0	.00	2.0	2.0	.43
JAN 07...	--	--	--	--	--	.71	.04	.75	.71	.92
MAR 17...	21	.2	4.0	200	175	1.9	.10	2.0	1.9	1.0
MAY 05...	--	--	--	--	--	1.7	.05	1.8	1.7	.40
JUL 09...	--	--	--	--	--	3.3	.04	3.3	3.3	1.1
SEP 25...	52	.3	12	608	529	1.5	.07	1.6	.97	.03
NOV 03...	--	--	--	--	--	.83	.01	.84	.83	.22

04176418 SALINE RIVER ABOVE MILAN, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO NOVEMBER 1980--CONTINUED

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE DISSOL. (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)
NOV 07...	--	--	--	--	.130	.12	--	--	--	--
JAN 07...	--	--	--	--	.110	.09	--	--	--	--
MAR 17...	2.2	3.2	5.2	23	.400	.16	.01	--	--	--
MAY 05...	--	--	--	--	.030	.01	--	--	--	--
JUL 09...	--	--	--	--	.150	.13	--	--	--	--
SEP 25...	.73	.76	2.4	10	.250	.13	.06	2	1	1
NOV 03...	--	--	--	--	.120	.11	--	--	--	--

DATE	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	ZINC, DIS-SOLVED (UG/L AS ZN)	METHY-LENE BLUE ACTIVE SUB-STANCE (MG/L)
NOV 07...	--	--	--	--	--	--	--	--	--	.00
JAN 07...	--	--	--	--	--	--	--	--	--	<.10
MAR 17...	--	--	--	--	--	--	--	--	--	.00
MAY 05...	--	--	--	--	--	--	--	--	--	.00
JUL 09...	--	--	--	--	--	--	--	--	--	<.10
SEP 25...	0	0	60	1	30	<.1	13	0	0	<.10
NOV 03...	--	--	--	--	--	--	--	--	--	<.10

04176500 RIVER RAISIN NEAR MONROE, MI
(National stream-quality accounting network station)

LOCATION.--Lat 41°57'38", long 83°31'52", Monroe County, Hydrologic Unit 04100002, on left bank 0.8 mi (1.3 km) downstream from bridge on Ida Maybee Road, 5.0 mi (8.0 km) downstream from Saline River, and 7.5 mi (12.1 km) west of Monroe.

DRAINAGE AREA.--1,042 mi^2 (2,699 km^2).

WATER-DISCHARGE RECORDS

PERIOD OF RECORD.--September 1937 to current year. Published as "Raisin River at Monroe" 1937-52 and as "River Raisin at Monroe" 1952-53.

REVISED RECORDS.--WSP 954: 1938-40(M), 1941. WSP 1437: 1939, 1948. WSP 2112: Drainage area.

GAGE.--Water-stage recorder. Datum of gage is 616.26 ft (187.836 m) National Geodetic Vertical Datum of 1929. Prior to Oct. 1, 1953, at site 9 mi (14 km) downstream at datum 46.26 ft (14.100 m) lower.

REMARKS.--Water-discharge records good. Diurnal fluctuation caused by powerplants above station prior to June 27, 1968.

AVERAGE DISCHARGE.--43 years, 701 ft^3/s (19.85 m^3/s), 9.14 in/yr (232 mm/yr).

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 12,900 ft^3/s (365 m^3/s) May 19, 1945, Mar. 29, 1950; maximum gage height, 10.7 ft (3.26 m) Feb. 1, 1949, backwater from ice, site and datum then in use; minimum discharge, about 2 ft^3/s (0.06 m^3/s) Sept. 4, 1938, Sept. 19, 20, 1941, site then in use.

EXTREMES FOR CURRENT YEAR.--Peak discharges above base of 3,500 ft^3/s (99.1 m^3/s) and maximum (*):

Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)	Date	Time	Discharge (ft^3/s)	Discharge (m^3/s)	Gage height (ft)	Gage height (m)
Dec. 26	0300	4100	116	6.63	2.021	Apr. 15	unknown	4030	114	6.58	2.006
Mar. 22	0400	*5650	160	*7.62	2.323	June 4	0400	4050	115	6.59	2.009
Apr. 4	1800	4770	135	7.07	2.155	Aug. 22	1500	3960	112	6.72	2.048

Minimum discharge, 105 ft^3/s (2.97 m^3/s) Oct. 3, gage height, 2.12 ft (0.646 m).

DISCHARGE, IN CUBIC FEET PER SECOND, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
MEAN VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	110	179	620	1530	335	551	2610	1220	581	306	549	1040
2	116	175	570	1190	320	443	2460	1080	848	336	543	1250
3	109	176	520	991	298	396	2380	943	2940	294	1500	1490
4	110	191	460	847	291	394	4230	855	3710	287	1970	1470
5	185	197	480	753	281	351	3900	788	3100	355	1830	1280
6	188	205	490	659	261	387	3690	720	3090	480	1470	908
7	167	199	500	600	256	324	3540	645	2810	511	1020	663
8	159	192	490	480	255	299	3140	565	3310	513	704	527
9	186	199	470	480	240	316	2700	532	2870	411	503	458
10	196	208	450	490	235	333	2900	508	2490	355	411	401
11	183	230	440	554	240	420	2800	507	2190	343	398	377
12	174	265	440	674	235	542	2320	509	1850	361	450	332
13	171	257	440	725	230	480	2310	540	1350	320	428	315
14	183	249	430	766	223	440	2150	569	1010	284	458	319
15	197	238	420	700	227	410	3660	610	861	265	560	349
16	191	223	390	593	229	470	3300	630	1020	267	800	381
17	173	216	380	579	225	1880	2600	612	1280	264	739	391
18	163	212	352	597	225	4100	2100	1270	1170	266	565	427
19	204	211	375	627	221	3860	1800	1740	971	265	490	511
20	191	220	380	683	215	3980	1550	1920	846	243	1620	493
21	168	225	402	659	236	4660	1360	1840	741	226	2440	450
22	152	230	402	624	530	4990	1190	1560	655	225	3710	410
23	146	390	450	560	977	3920	1050	1180	585	240	3350	403
24	142	540	1200	467	1050	3690	933	928	539	381	2830	406
25	161	660	3530	450	1270	3870	843	759	502	453	2310	438
26	202	770	3820	412	1320	3200	807	654	470	310	1520	404
27	191	850	3560	415	1040	2800	780	588	421	226	919	366
28	175	880	3820	395	738	2520	850	529	375	270	658	353
29	170	860	3560	382	621	2430	1090	483	351	580	480	330
30	173	720	2940	357	---	2400	1250	456	287	1130	393	325
31	174	---	2170	350	---	2520	---	531	---	961	368	---
TOTAL	5210	10367	34951	19599	12824	57376	66293	26271	43223	11728	35986	17267
MEAN	168	346	1127	632	442	1851	2210	847	1441	378	1161	576
MAX	204	880	3820	1530	1320	4990	4230	1920	3710	1130	3710	1490
MIN	109	175	352	350	215	299	780	456	287	225	368	315
CFSM	.16	.33	1.08	.61	.42	1.78	2.12	.81	1.38	.36	1.11	.55
IN.	.19	.37	1.25	.70	.46	2.05	2.37	.94	1.54	.42	1.28	.62

CAL YR 1979 TOTAL 252091 MEAN 691 MAX 5080 MIN 107 CFSM .66 IN 9.00
WTR YR 1980 TOTAL 341085 MEAN 932 MAX 4990 MIN 109 CFSM .89 IN 12.18

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1966-72, 1978 to current year.

PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: April 1978 to current year.
WATER TEMPERATURES: March 1966 to September 1972, April 1978 to current year.
SUSPENDED SEDIMENT DISCHARGE: March 1966 to September 1972.

REMARKS.--Daily specific conductance and water temperature records are based on once-daily measurements by a local observer at 1900 hours. Depth-integrated monthly samples are collected as a cross-section sample at gaging station or at bridge .8 mi (1.3 km) upstream on Ida Maybee Road. Biological Data (Phytoplankton) is for the 1979-80 water years.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SPECIFIC CONDUCTANCE: Maximum daily, 1,020 micromhos Feb. 16, 1979; minimum daily, 316 micromhos, Dec. 23, 1979.
WATER TEMPERATURES: Maximum daily recorded (water years 1967, 1970-1972) 32.0°C July 18, 1972; minimum daily, 0.0°C on many days during winter periods.
SEDIMENT CONCENTRATIONS: Maximum daily 1,430 mg/l Dec. 22, 1967; minimum daily, 1 mg/l on several days in 1969 and 1970.
SEDIMENT LOADS: Maximum daily, 28,000 tons (25,400 tonnes), Dec. 22, 1967; minimum daily, 0.29 ton (0.26 tonne) Aug. 31, 1971.

EXTREMES FOR CURRENT YEAR.--
SPECIFIC CONDUCTANCE: Maximum daily, 872 micromhos Nov. 1, 2; minimum daily, 316 micromhos Dec. 23.
WATER TEMPERATURES: Maximum daily, 30.0°C; minimum daily, 0.0°C on many days during winter period.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, WATER (DEG C)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	COLI-FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP-TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)
OCT 15...	1420	190	803	8.3	11.0	12.8	117	K51	160	340	120	99
NOV 19...	1130	213	813	8.2	6.5	12.1	99	22	91	340	110	100
DEC 17...	1415	383	813	7.9	.0	14.4	99	>600	K15	370	130	110
JAN 21...	1300	640	708	7.9	1.5	13.8	100	K39	K36	340	120	98
FEB 25...	1415	1160	518	7.7	.0	13.2	92	>200	>660	210	64	60
MAR 24...	1400	3620	430	7.7	3.0	11.9	91	>6000	K1500	210	83	61
APR 21...	1500	1300	611	8.1	13.5	7.4	70	K860	K24	290	89	83
JUN 02...	1400	824	660	7.7	21.5	7.8	90	--	--	280	75	81
23...	1430	580	644	8.1	22.5	8.2	94	170	190	290	69	84
JUL 28...	1400	276	601	8.0	23.5	6.0	71	E7	K1400	280	120	86
AUG 18...	1430	559	575	7.9	23.0	8.1	94	K1700	390	280	79	82
SEP 03...	1400	1510	660	8.2	23.0	7.8	91	--	K1800	320	95	97

DATE	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SILVER, TOTAL RECOV-ERABLE (UG/L AS AG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM AD-SORP-TION RATIO	SODIUM PERCENT	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
OCT 15...	23	--	33	.8	22	4.7	270	0	221	2.2	110
NOV 19...	23	0	25	.6	13	3.7	290	0	238	2.9	100
DEC 17...	22	--	21	.5	11	3.2	290	0	238	5.8	110
JAN 21...	23	0	19	.4	11	2.1	270	0	221	5.4	77
FEB 25...	15	0	21	.6	17	5.7	180	0	148	5.7	51
MAR 24...	13	--	7.7	.2	7	3.9	150	0	123	4.8	44
APR 21...	19	0	13	.3	9	2.8	240	0	197	3.1	60
JUN 02...	20	0	21	.5	14	2.7	270	0	220	8.2	64
23...	20	--	15	.4	10	2.8	270	0	221	3.4	48
JUL 28...	16	0	15	.4	10	6.8	200	0	160	3.1	91
AUG 18...	18	0	13	.3	9	3.4	290	0	200	4.9	48
SEP 03...	20	--	13	.3	8	7.0	300	0	230	2.8	63

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	CHLORIDE, DISSOLVED (MG/L AS CL)	FLUORIDE, DISSOLVED (MG/L AS F)	SILICA, DISSOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DISSOLVED (MG/L)	SOLIDS, SUM OF CONSTITUENTS, DISSOLVED (MG/L)	SOLIDS, DISSOLVED (TONS PER DAY)	NITROGEN, NO2+NO3 TOTAL (MG/L AS N)	NITROGEN, NO2+NO3 DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS N)	NITROGEN, AMMONIA DISSOLVED (MG/L AS N)	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)
OCT											
15...	56	.3	7.3	481	470	247	.93	.89	.180	.000	.22
NOV											
19...	40	.3	4.1	471	443	271	1.0	.81	.040	.010	.05
DEC											
17...	45	.2	7.5	509	475	526	2.9	3.0	.190	.140	.23
JAN											
21...	42	.2	7.3	459	284	793	3.4	3.4	.180	.140	.22
FEB											
25...	41	.2	8.6	335	302	1050	2.6	2.5	.200	--	.24
MAR											
24...	27	.2	5.8	357	190	3490	6.2	6.2	.250	.250	.30
APR											
21...	32	.2	4.9	408	352	1430	4.5	4.3	.070	.070	.08
JUN											
02...	37	.3	6.0	477	368	1060	4.5	2.2	.040	.000	.05
23...	31	.3	6.6	396	353	620	2.8	2.8	.010	.000	.01
JUL											
28...	28	.3	8.1	459	369	342	4.8	4.8	.030	.020	.04
AUG											
18...	31	.3	10	366	337	552	2.5	2.5	.010	.000	.01
SEP											
03...	32	.3	11	474	395	1930	3.1	3.1	.030	.050	.04

DATE	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	CARBON, ORGANIC TOTAL (MG/L AS C)	SEDIMENT, SUSPENDED (MG/L)	SEDIMENT DISCHARGE, SUSPENDED (T/DAY)	SED. SUSP. SIEVE DIAM. % FINER THAN .062 MM
OCT											
15...	1.1	1.3	2.2	9.9	.220	.67	.170	--	10	5.1	100
NOV											
19...	.52	.56	1.6	6.9	.150	.46	.130	6.9	1	.58	100
DEC											
17...	.81	1.0	3.9	17	.110	.34	.040	6.4	48	50	100
JAN											
21...	.92	1.1	4.5	20	.090	.28	.080	--	8	14	100
FEB											
25...	2.8	3.0	5.6	25	.390	1.2	.390	6.7	110	345	100
MAR											
24...	1.2	1.4	7.6	34	.390	1.2	.150	9.9	94	919	100
APR											
21...	.87	.94	5.4	24	.180	.55	.050	--	36	126	100
JUN											
02...	.91	.95	5.5	24	.200	.61	.130	11	47	105	100
23...	.83	.84	3.6	16	.150	.46	.070	9.2	44	69	100
JUL											
28...	.96	.99	5.8	25	.180	.55	.100	--	58	43	100
AUG											
18...	1.1	1.1	3.6	16	.080	.25	.080	6.7	54	82	100
SEP											
03...	.65	.68	3.8	17	.260	.80	.110	8.4	100	408	100

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

WATER-QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--CONTINUED

DATE	TIME	ARSENIC TOTAL (UG/L AS AS)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, TOTAL RECOVERABLE (UG/L AS BA)	BARIUM, DISSOLVED (UG/L AS BA)	CADMIUM TOTAL RECOVERABLE (UG/L AS CD)	CADMIUM DISSOLVED (UG/L AS CD)	CHROMIUM, TOTAL RECOVERABLE (UG/L AS CR)	CHROMIUM, DISSOLVED (UG/L AS CR)	COBALT, TOTAL RECOVERABLE (UG/L AS CO)
OCT 15...	1420	5	--	--	30	0	0	20	10	0
JAN 21...	1300	4	3	100	70	0	0	<10	<10	4
APR 21...	1500	2	1	--	60	0	0	10	<10	4
JUL 28...	1400	2	2	100	70	2	2	20	10	5

DATE	COBALT, DISSOLVED (UG/L AS CO)	COPPER, TOTAL RECOVERABLE (UG/L AS CU)	COPPER, DISSOLVED (UG/L AS CU)	IRON, TOTAL RECOVERABLE (UG/L AS FE)	IRON, DISSOLVED (UG/L AS FE)	LEAD, TOTAL RECOVERABLE (UG/L AS PB)	LEAD, DISSOLVED (UG/L AS PB)	MANGANESE, TOTAL RECOVERABLE (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)
OCT 15...	0	6	2	580	10	7	0	40	20	.2
JAN 21...	4	8	4	330	10	5	0	40	30	.2
APR 21...	4	5	2	1500	20	3	0	70	20	.1
JUL 28...	0	9	3	2400	10	6	0	10	9	.2

DATE	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, TOTAL RECOVERABLE (UG/L AS NI)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, TOTAL (UG/L AS SE)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CARBON, ORGANIC SUSPENDED (MG/L AS C)
OCT 15...	<.1	9	9	0	0	0	60	7	5.5	1.4
JAN 21...	.2	9	4	1	0	0	--	5	6.3	.4
APR 21...	.1	5	1	--	0	0	20	8	6.0	.9
JUL 28...	.2	9	2	0	0	0	30	4	9.0	.9

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
PERIPHYTON

DATE	TIME	LENGTH OF EXPOSURE (DAYS)	BIOMASS CHLOROPHYLL RATIO PERIPHYTON (UNITS)	PERIPHYTON BIOMASS ASH WEIGHT G/SQ M	PERIPHYTON BIOMASS TOTAL DRY WEIGHT G/SQ M	CHLOR-A PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)	CHLOR-B PERIPHYTON CHROMOGRAPHIC FLUOROM (MG/M2)
DEC 17...	1415	28	.00	.160	.160	.080	.000
JUN 23...	1430	21	989	44.7	48.3	3.64	.460
AUG 18...	1430	21	20.7	5.20	5.43	11.1	1.05

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	NOV 6,78		MAR 15,79		MAY 22,79		JUN 18,79		JUL 17,79	
TIME	1430		1000		1330		1400		1620	
TOTAL CELLS/ML	16000		760		17000		37000		8100	
DIVERSITY: DIVISION	0.3		1.3		1.7		1.2		1.6	
.CLASS	0.6		1.3		1.7		1.2		1.6	
..ORDER	0.9		1.3		1.9		1.8		2.0	
...FAMILY	0.9		1.7		2.5		3.0		2.5	
....GENUS	1.4		0.0		2.9		3.3		3.3	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	--	-	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	--	-	250	1	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	--	-	--	-	--	-	4800	13	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	6500#	18	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	990	6	--	-	50	1
...OOCYSTACEAE										
....ANKISTRODESMUS	--	-	--	-	490	3	910	2	100	1
....CHLORELLA	--	-	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	120	1	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	400	1	350	4
....KIRCHNERIELLA	--	-	--	-	--	-	*	0	100	1
....OOCYSTIS	140	1	--	-	490	3	1200	3	400	5
....SELENASTRUM	--	-	--	-	370	2	--	-	--	-
....TETRAEDRON	--	-	--	-	120	1	--	-	50	1
....TREUBARIA	--	-	--	-	--	-	--	-	250	3
...SCENEDESMACEAE										
....CRUCIGENIA	--	-	--	-	--	-	1200	3	400	5
....SCENEDESMUS	280	2	--	-	2700#	16	4900	13	1300#	16
....TETRASTRUM	--	-	--	-	--	-	--	-	--	-
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	--	-	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	--	-	14	2	--	-	--	-	--	-
....CHLAMYDOMONAS	--	-	86	11	490	3	3800	10	350	4
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	1600	4	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	12000#	73	--	-	370	2	7000#	19	2800#	34
....MELOSIRA	1900	12	--	-	250	1	200	1	550	7
....SKELETONEMA	--	-	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	5300#	31	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	58	8	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	14	2	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	830	5	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	--	-	50	8	--	-	400	1	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	--	-	--	-
...NAVICULACEAE										
....NAVICULA	140	1	14	2	--	-	*	0	--	-
...NITZSCHIACEAE										
....NITZSCHIA	--	-	--	-	250	1	--	-	150	2
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	--	-	50	1
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	690	4	--	-	--	-	--	-	--	-

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	NOV 6,78 1430		MAR 15,79 1000		MAY 22,79 1330		JUN 18,79 1400		JUL 17,79 1620	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	370	2	--	-	--	-
...CRYPTOMONADACEAE										
....CRYPTOMONAS	--	-	--	-	120	1	--	-	250	3
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	--	-	--	-	4300#	25	3200	9	--	-
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	300	1	450	6
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	500#	66	--	-	--	-	350	4
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	14	2	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-	50	1
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	280	2	--	-	--	-	--	-	100	1

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	AUG 13,79		SEP 11,79		NOV 19,79		MAR 24,80		JUN 2,80	
TIME	1300		1400		1130		1400		1400	
TOTAL CELLS/ML	12000		66000		8100		210		6700	
DIVERSITY: DIVISION	1.2		0.7		0.9		1.0		1.5	
.CLASS	1.2		0.7		0.9		1.0		1.5	
..ORDER	1.9		0.0		0.9		1.7		2.0	
...FAMILY	2.4		0.0		1.3		2.6		2.4	
....GENUS	3.2		0.0		1.7		2.6		2.8	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)										
.CHLOROPHYCEAE										
..CHLOROCOCCALES										
...CHARACIACEAE										
....SCHROEDERIA	64	1	--	-	--	-	--	-	--	-
...CHLOROCOCCACEAE										
....CHLOROCOCCUM	--	-	1000	2	--	-	--	-	--	-
...COELASTRACEAE										
....COELASTRUM	380	3	--	-	--	-	--	-	--	-
...HYDRODICTYACEAE										
....PEDIASTRUM	--	-	--	-	--	-	--	-	--	-
...MICRACTINIACEAE										
....GOLENKINIA	--	-	--	-	--	-	--	-	--	-
....MICRACTINIUM	--	-	--	-	--	-	--	-	56	1
...OOCYSTACEAE										
....ANKISTRODESMUS	130	1	--	-	110	1	5	2	56	1
....CHLORELLA	--	-	4300	7	5700#	70	--	-	170	3
....CHODATELLA	--	-	--	-	--	-	--	-	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	--	-	--	-
....KIRCHNERIELLA	320	3	--	-	54	1	--	-	--	-
....OOCYSTIS	380	3	--	-	--	-	--	-	--	-
....SELENASTRUM	190	2	--	-	--	-	--	-	390	6
....TETRAEDRON	--	-	--	-	--	-	--	-	84	1
....TREUBARIA	--	-	--	-	--	-	--	-	*	0
...SCENEDESMACEAE										
....CRUCIGENIA	1800	15	4000	6	380	5	--	-	--	-
....SCENEDESMUS	3400#	29	1300	2	110	1	--	-	840	13
....TETRASTRUM	--	-	--	-	220	3	--	-	340	5
..TETRASPORALES										
...COCCOMYXACEAE										
....ELAKATOTHRIX	130	1	--	-	--	-	--	-	--	-
...PALMELLACEAE										
....SPHAEROCYSTIS	--	-	--	-	--	-	--	-	--	-
..VOLVOCALES										
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	1700	14	*	0	54	1	40#	19	200	3
...VOLVOCACEAE										
....PANDORINA	--	-	--	-	--	-	--	-	--	-
CHRYSOPHYTA										
.BACILLARIOPHYCEAE										
..CENTRALES										
...COSCINODISCACEAE										
....CYCLOTELLA	1300	11	--	-	1000	13	35#	17	730	11
....MELOSIRA	760	6	--	-	--	-	--	-	110	2
....SKELETONEMA	--	-	54000#	83	110	1	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-	--	-
..PENNALES										
...ACHNANTHACEAE										
....ACHNANTHES	--	-	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	--	-	--	-	--	-	--	-	--	-
...CYMBELLACEAE										
....AMPHORA	--	-	--	-	--	-	--	-	--	-
...DIATOMACEAE										
....DIATOMA	--	-	--	-	--	-	--	-	--	-
...FRAGILARIACEAE										
....SYNEDRA	--	-	--	-	--	-	5	2	--	-
...MERIDIONACEAE										
....MERIDION	--	-	--	-	--	-	10	5	--	-
...NAVICULACEAE										
....NAVICULA	--	-	--	-	--	-	65#	31	*	0
...NITZSCHIACEAE										
....NITZSCHIA	64	1	*	0	--	-	35#	17	140	2
...SURIRELLACEAE										
....SURIRELLA	--	-	--	-	--	-	5	2	--	-
.CHRYSOPHYCEAE										
..CHRYSOMONADALES										
...OCHROMONADACEAE										
....DINOBRYON	--	-	--	-	--	-	--	-	--	-

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE TIME	AUG 13,79 1300		SEP 11,79 1400		NOV 19,79 1130		MAR 24,80 1400		JUN 2,80 1400	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CRYPTOPHYTA (CRYPTOMONADS)										
.CRYPTOPHYCEAE	--	-	*	0	--	-	--	-	--	-
..CRYPTOMONADALES										
...CRYPTOCHRYSIDACEAE										
....CHROOMONAS	--	-	--	-	--	-	--	-	*	0
...CRYPTOMONADACEAE										
....CRYPTOMONAS	700	6	--	-	54	1	--	-	--	-
CYANOPHYTA (BLUE-GREEN ALGAE)										
.CYANOPHYCEAE										
..CHROOCOCCALES										
...CHROOCOCCACEAE										
....ANACYSTIS	570	5	--	-	320	4	--	-	2900#	44
..HORMOGONALES										
...NOSTOCACEAE										
....ANABAENA	--	-	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE										
....OSCILLATORIA	--	-	--	-	--	-	--	-	560	8
EUGLENOPHYTA (EUGLENOIDS)										
.EUGLENOPHYCEAE										
..EUGLENALES										
...EUGLENACEAE										
....EUGLENA	--	-	--	-	--	-	--	-	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-	--	-
....PHACUS	--	-	--	-	--	-	--	-	--	-
....TRACHELOMONAS	--	-	--	-	--	-	10	5	--	-

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 23,80		JUL 28,80		AUG 18,80		SEP 3,80	
TIME	1430		1400		1430		1400	
TOTAL CELLS/ML	7100		3600		4400		3900	
DIVERSITY: DIVISION	1.2		1.3		1.3		1.7	
.CLASS	1.2		1.3		1.3		1.7	
..ORDER	1.8		1.6		1.8		2.4	
...FAMILY	1.9		2.5		2.3		2.8	
....GENUS	2.5		3.1		2.6		3.2	
ORGANISM	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT	CELLS /ML	PER- CENT
CHLOROPHYTA (GREEN ALGAE)								
.CHLOROPHYCEAE								
..CHLOROCOCCALES								
...CHARACIACEAE								
....SCHROEDERIA	--	-	--	-	--	-	20	1
...CHLOROCOCCACEAE								
....CHLOROCOCCUM	--	-	--	-	--	-	--	-
...COELASTRACEAE								
....COELASTRUM	--	-	540	15	2300#	51	--	-
...HYDRODICTYACEAE								
....PEDIASTRUM	--	-	390	11	--	-	--	-
...MICRACTINIACEAE								
....GOLENKINIA	--	-	26	1	*	0	--	-
....MICRACTINIUM	--	-	52	1	--	-	80	2
...OOCYSTACEAE								
....ANKISTRODESMUS	--	-	--	-	39	1	40	1
....CHLORELLA	--	-	--	-	--	-	--	-
....CHODATELLA	--	-	--	-	*	0	--	-
....CLOSTERIOPSIS	--	-	--	-	--	-	--	-
....DICTYOSPHAERIUM	--	-	--	-	--	-	20	1
....KIRCHNERIELLA	--	-	--	-	26	1	--	-
....OOCYSTIS	--	-	26	1	26	1	80	2
....SELENASTRUM	*	0	26	1	26	1	20	1
....TETRAEDRON	--	-	--	-	--	-	20	1
....TREUBARIA	--	-	*	0	--	-	20	1
...SCENEDESMACEAE								
....CRUCIGENIA	130	2	52	1	100	4	520	13
....SCENEDESMUS	--	-	590#	16	77	2	240	6
....TETRASTRUM	--	-	52	1	--	-	--	-
..TETRASPORALES								
...COCCOMYXACEAE								
....ELAKATOTHRIX	--	-	--	-	--	-	--	-
...PALMELLACEAE								
....SPHAEROCYSTIS	--	-	--	-	310	7	--	-
..VOLVOCALES								
...CHLAMYDOMONADACEAE	--	-	--	-	--	-	--	-
....CHLAMYDOMONAS	330	5	77	2	64	1	420	11
...VOLVOCACEAE								
....PANDORINA	--	-	--	-	--	-	--	-
CHRYSOPHYTA								
.BACILLARIOPHYCEAE								
..CENTRALES								
...COSCINODISCACEAE								
....CYCLOTELLA	2100#	29	680#	19	710#	16	1000#	26
....MELOSIRA	2100#	30	790#	22	140	3	80	2
....SKELETONEMA	--	-	--	-	--	-	--	-
....STEPHANODISCUS	--	-	--	-	--	-	--	-
..PENNALES								
...ACHNANTHACEAE								
....ACHNANTHES	--	-	--	-	--	-	--	-
....RHOICOSPHENIA	870	12	--	-	--	-	--	-
...CYMBELLACEAE								
....AMPHORA	--	-	--	-	--	-	--	-
...DIATOMACEAE								
....DIATOMA	--	-	--	-	--	-	--	-
...FRAGILARIACEAE								
....SYNEDRA	--	-	--	-	--	-	--	-
...MERIDIONACEAE								
....MERIDION	--	-	--	-	--	-	--	-
...NAVICULACEAE								
....NAVICULA	--	-	--	-	*	0	40	1
...NITZSCHIACEAE								
....NITZSCHIA	200	3	130	4	100	2	140	4
...SURIRELLACEAE								
....SURIRELLA	*	0	--	-	--	-	--	-
.CHRYSOPHYCEAE								
..CHRYSOMONADALES								
...OCHROMONADACEAE								
....DINOBRYON	--	-	--	-	--	-	--	-

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

QUALITATIVE AND ASSOCIATED QUANTITATIVE ANALYSES OF BIOLOGICAL DATA, WATER YEAR OCTOBER 1978 TO SEPTEMBER 1980
IDENTIFICATION OF PHYTOPLANKTON

DATE	JUN 23,80		JUL 28,80		AUG 18,80		SEP 3,80	
TIME	1430		1400		1430		1400	
ORGANISM	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT	CELLS /ML	PER-CENT
CRYPTOPHYTA (CRYPTOMONADS)								
.CRYPTOPHYCEAE	--	-	--	-	--	-	--	-
..CRYPTOMONADALES								
...CRYPTOCHRYSIDACEAE								
....CHROOMONAS	*	0	--	-	*	0	--	-
...CRYPTOMONADACEAE								
....CRYPTOMONAS	67	1	26	1	100	2	20	1
CYANOPHYTA (BLUE-GREEN ALGAE)								
.CYANOPHYCEAE								
..CHROOCOCCALES								
...CHROOCOCCACEAE								
....ANACYSTIS	1100#	16	77	2	250	6	740#	19
..HORMOGONALES								
...NOSTOCACEAE								
....ANABAENA	--	-	--	-	--	-	--	-
...OSCILLATORIACEAE								
....OSCILLATORIA	--	-	--	-	--	-	360	9
EUGLENOPHYTA (EUGLENOIDS)								
.EUGLENOPHYCEAE								
..EUGLENALES								
...EUGLENACEAE								
....EUGLENA	*	0	64	2	39	1	--	-
....LEPOCINCLIS	--	-	--	-	--	-	--	-
....PHACUS	*	0	--	-	--	-	--	-
....TRACHELOMONAS	--	-	*	0	--	-	20	1

NOTE: # - DOMINANT ORGANISM; EQUAL TO OR GREATER THAN 15%
* - OBSERVED ORGANISM, MAY NOT HAVE BEEN COUNTED; LESS THAN 1/2%

04176500 RIVER RAISIN NEAR MONROE, MI--CONTINUED

SPECIFIC CONDUCTANCE (MICROMHOS/CM AT 25 DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	747	872	721	605	460	---	626	661	678	659	567	580
2	744	872	718	640	661	522	624	644	675	760	548	---
3	741	831	720	654	551	574	---	650	485	688	546	658
4	756	832	718	691	571	592	478	650	551	649	555	639
5	782	763	752	606	543	606	543	676	495	647	556	610
6	829	866	760	682	454	651	502	676	495	621	---	617
7	829	867	757	668	647	607	601	682	492	710	548	646
8	793	866	748	708	550	608	601	677	539	710	577	668
9	708	736	742	800	462	679	599	701	539	715	610	680
10	705	746	751	800	420	687	599	720	529	705	672	728
11	811	750	751	740	497	676	599	674	529	631	697	728
12	755	724	781	738	669	685	594	667	602	647	697	749
13	747	714	784	740	755	696	594	663	600	647	686	689
14	747	769	756	744	717	637	562	711	630	629	683	687
15	702	824	782	753	733	582	560	699	630	643	602	692
16	705	821	551	719	804	401	567	689	630	643	624	742
17	744	724	732	703	804	404	545	641	629	643	572	754
18	744	724	672	709	805	407	573	640	629	643	652	754
19	746	750	589	697	806	382	574	674	661	654	573	739
20	730	759	746	706	808	358	611	613	661	627	494	710
21	730	760	593	463	808	431	613	599	650	639	490	712
22	731	725	457	479	783	431	634	644	632	643	490	696
23	736	726	316	517	539	455	650	615	631	633	519	722
24	760	724	365	512	593	486	650	648	677	704	532	758
25	763	717	545	582	535	486	646	589	691	655	535	757
26	793	394	560	600	---	536	642	648	689	662	577	757
27	792	684	527	535	---	548	641	654	681	590	652	739
28	782	675	507	527	---	600	638	689	640	---	685	686
29	773	690	539	534	---	596	664	690	653	568	680	774
30	779	720	490	568	---	626	642	652	652	584	664	774
31	764	---	469	612	---	626	---	652	---	554	665	---
MEAN	757	754	642	646				661	609			

TEMPERATURE, WATER (DEG. C), WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
ONCE-DAILY

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1	21.5	11.0	3.5	2.0	.0	.0	7.0	13.5	22.5	26.0	28.0	25.0
2	19.5	10.0	3.0	2.0	.0	.0	8.0	16.0	23.0	26.0	25.0	24.5
3	18.0	11.5	2.0	1.5	.0	.0	6.0	18.5	19.5	25.5	25.0	25.0
4	18.0	13.0	2.0	2.0	.0	3.5	5.0	20.0	19.0	23.0	25.0	25.5
5	14.0	9.5	3.0	.5	.0	1.5	10.0	21.0	21.0	26.0	26.0	25.0
6	12.0	8.0	3.5	.0	.0	1.5	11.0	20.0	22.5	25.0	26.0	25.0
7	13.0	7.5	3.5	.0	.0	.5	10.5	15.0	21.0	26.5	27.5	22.0
8	14.0	6.0	4.5	.0	.0	.5	8.0	14.0	16.0	26.0	28.5	25.5
9	13.0	6.0	5.0	.0	.0	3.0	7.0	16.0	16.5	26.0	25.5	22.5
10	14.0	5.0	4.5	.5	.0	3.5	7.0	17.0	17.5	26.5	25.5	20.0
11	10.0	5.5	8.5	1.0	.0	.5	9.0	18.0	19.0	27.0	26.0	21.5
12	10.0	4.5	4.0	.0	.0	.0	7.0	16.0	21.0	27.0	25.5	21.0
13	10.5	5.0	2.0	1.0	.0	.5	9.0	18.0	21.0	27.0	24.5	21.0
14	11.0	4.0	1.0	1.0	.0	2.0	8.0	16.5	20.0	27.0	25.5	20.5
15	15.0	4.5	2.5	1.5	.0	2.0	6.5	15.5	19.5	30.0	24.0	20.0
16	12.0	4.0	.5	3.0	.0	2.0	7.0	16.5	18.5	26.0	24.0	20.5
17	13.0	7.5	.5	3.5	.0	3.5	8.5	18.0	22.0	26.5	24.5	21.5
18	15.0	10.0	.0	2.0	.0	4.0	12.0	18.0	22.5	26.0	25.0	21.0
19	18.0	10.0	1.5	1.5	.0	5.5	13.5	17.5	22.5	27.0	24.5	21.0
20	16.0	8.0	1.0	2.0	1.5	7.0	14.5	18.0	22.0	29.0	25.0	23.5
21	21.0	9.0	5.0	2.0	2.5	5.0	15.0	20.0	23.0	27.5	25.5	24.0
22	22.0	8.0	6.0	2.0	2.5	4.5	14.0	20.0	23.0	27.0	25.0	24.5
23	20.0	8.5	5.5	.0	2.0	3.5	17.0	20.0	24.0	27.0	25.5	22.5
24	18.0	9.0	5.0	.0	2.0	3.0	12.0	21.0	24.0	27.5	25.0	21.0
25	17.0	8.0	2.0	.0	.0	3.0	15.5	20.5	25.0	26.5	25.0	20.0
26	13.5	7.0	4.0	.0	.0	3.5	15.0	20.0	26.0	28.0	26.0	16.0
27	13.0	3.0	5.0	.0	.0	7.0	12.0	22.0	26.0	25.0	26.0	17.0
28	12.0	3.5	3.0	.0	.0	5.5	13.5	23.0	27.0	24.5	26.0	17.0
29	11.0	2.0	3.0	.0	.0	6.0	12.0	22.5	27.0	25.5	26.0	18.0
30	10.5	3.0	2.0	.0	---	6.0	13.5	21.0	27.0	28.0	26.5	18.5
31	15.0	---	2.5	.0	---	6.5	---	23.0	---	28.0	26.0	---
MEAN	15.0	7.0	3.0	1.0	.5	3.0	10.5	18.5	22.0	26.5	25.5	21.5

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

As the number of streams on which streamflow information is likely to be desired far exceeds the number of stream-gaging stations feasible to operate at one time, the Geological Survey collects limited stream-flow data at sites other than stream-gaging stations. When limited stream-flow data are collected on a systematic basis over a period of years for use in hydrologic analyses, the site at which the data are collected is called a partial-record station. Data collected at these partial-record stations are useable in low-flow or floodway analyses, depending on the type of data collected. In addition, discharge measurements are made at other sites not included in the partial-record program. These measurements are generally made in time of drought or flood to give better areal coverage to those events. Those measurements and others collected for some special reason are called measurements at miscellaneous sites.

Records collected at partial-record stations are presented in two tables. The first is a table of discharge measurements at low-flow partial-record stations and the second is a table of annual maximum stage and discharge at crest-stage stations. Discharge measurements made at miscellaneous sites for both low flow and high flow are given in a third table.

Low-flow partial-record stations

Measurements of streamflow in the area covered by this report made at low-flow partial-record stations are given in the following table. These measurements were made during periods of base flow when streamflow is primarily from ground-water storage. These measurements, when correlated with the simultaneous discharge of a nearby stream where continuous records are available, will give a picture of the low-flow potentiality of a stream. The column headed "Period of record" shows the water years in which measurements were made at the same, or practically the same, site.

Discharge measurements made at low-flow partial-record stations during water year 1980

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Superior				
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec. 23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73† 1974-79c 1980	06-24-80 07-30-80 09-03-80	90.6 134 265
04040315	Little Gratiot River near Lac Labelle, MI	Lat 47°22'04", long 88°02'16", in SE¼NW¼ sec. 6, T.57 N., R.29 W., Keweenaw County, 700 ft downstream from mouth of Deer Creek, 1 mile upstream from Lac Labelle, and 1.6 miles southwest of the village of Lac Labelle.	a25	1979-80	07-24-80	8.65
04044559	Peterson Creek near Sands, MI	Lat 46°24'21", long 87°20'38", in SW¼SW¼ sec. 5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, 500 ft upstream from mouth and 3.2 miles southeast of Sands.	7.24	1979-80	10-17-79 05-21-80 07-15-80	2.54 2.76 2.68
04044560	Big Creek near Sands, MI	Lat 46°24'43", long 87°19'57", in NW¼SE¼ sec. 5, T.46 N., R.24 W., Marquette County, at abandoned road crossing 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands.	14.4	1979-80	10-17-79 05-20-80 07-15-80	15.0 16.2 16.2
04044567	Big Creek near Beaver Grove, MI	Lat 46°27'55", long 87°19'07", in SE¼SW¼ sec. 16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth and 0.2 mile northwest of Beaver Grove.	24.0	1979-80	10-17-79 05-20-80 07-15-80	40.7 38.5 38.0
04044570	Cedar Creek near Sands, MI	Lat 46°26'11", long 87°24'20", in SW¼SW¼ sec. 26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands.	5.44	1979-80	10-17-79 05-21-80 07-15-80	.30 .25 .21
04044577	Cedar Creek near Beaver Grove, MI	Lat 46°28'23", long 87°19'46", in SE¼NE¼ sec. 17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth and 0.9 mile northwest of Beaver Grove.	10.6	1979-80	10-17-79 05-20-80 07-15-80	19.5 18.1 17.8
04044581	Cherry Creek near Sands, MI	Lat 46°27'47", long 87°23'31", in NW¼NE¼ sec. 23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480 and 3.1 miles northeast of Sands.	.33	1979-80	10-17-79 05-20-80 07-15-80	5.44 5.30 5.26
04044586	Cherry Creek near Beaver Grove, MI	Lat 46°28'45", long 87°20'18", in SE¼SW¼ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth and 1.5 miles northwest of Beaver Grove.	5.07	1979-80	10-17-79 05-20-80 07-15-80	26.6 25.8 25.3
04044592	Silver Creek near Sands, MI	Lat 46°28'48", long 87°23'07", in SW¼SW¼ sec. 12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northwest of Sands.	4.88	1979-80	10-17-79 05-21-80 07-15-80	2.54 2.71 2.35
04044597	Silver Creek near Harvey, MI	Lat 46°29'22", long 87°20'16", in NE¼NW¼ sec. 8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey.	10.8	1979-80	10-17-79 05-20-80 07-15-80	9.17 8.91 8.51

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Superior--Continued				
04044610	Sand River at Sand River, MI	Lat 46°29'22", long 87°07'31", in NW¼NE¼ sec. 12, T.47 N., R.23 W., Marquette County, at bridge on Duluth South Shore and Atlantic Railroad, 1 mile upstream from mouth, and 0.5 mile west of the village of Sand River.	29.5	1980	05-20-80 05-28-80 06-02-80 06-17-80 07-16-80 08-26-80 09-16-80	10.7 3.91 b29.1 b14.4 2.62 .35 b39.1
04044744	Munising Falls Creek at Munising, MI	Lat 46°25'28", long 86°37'27", in NW¼SE¼ sec. 36, T.47 N., R.19 W., Alger County, at culvert, 0.3 mile upstream from mouth, at Munising.		1979-80	10-09-79 05-05-80 08-18-80	1.45 2.70 1.07
04044750	Miners River near Van Meer, MI	Lat 46°25'12", long 86°31'23", in SE¼SW¼ sec. 35, T.47 N., R.18 W., Alger County, at culvert on County Road H-58, 2.5 miles west of Van Meer.		1979-80	10-09-79 05-05-80 08-18-80	6.33 19.6 4.38
04044755	Miners River near Munising, MI	Lat 46°29'18", long 86°32'26", in SW¼NE¼ sec. 10, T.47 N., R.18 W., Alger County, at bridge on Pictured Rocks Trail road about 1 mile upstream from mouth and 7.5 miles northeast of Munising.		1979-80	10-09-79 05-05-80 08-18-80	15.4 57.2 14.6
04044762	Mosquito River near Melstrand, MI	Lat 46°31'07", long 86°28'41", in NW¼NE¼ sec. 31, T.48 N., R.17 W., Alger County, 150 ft downstream from confluence with tributary from west, downstream from Mosquito Falls and 4.7 miles northwest of Melstrand.		1979-80	10-09-79 05-06-80 08-19-80	5.35 24.5 4.92
04044765	Chapel Creek near Melstrand, MI	Lat 46°32'54", long 86°26'20", in NE¼NW¼ sec. 21, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6 miles north of Melstrand.		1979-80	10-10-79 05-07-80 08-02-80 08-19-80	7.90 13.3 f .3 2.48
04044766	Spray Creek near Melstrand, MI	Lat 46°33'27", long 86°24'38", in SE¼NE¼ sec. 15, T.48 N., R.17 W., Alger County, 100 ft upstream from mouth and 6.5 miles north of Melstrand.		1979-80	10-10-79 05-07-80 08-19-80	6.44 9.33 6.18
04044770	Beaver Creek near Melstrand, MI	Lat 46°34'39", long 86°21'02", in NE¼NE¼ sec. 7, T.48 N., R.16 W., Alger County, 0.7 mile downstream from Beaver Lake, 200 ft upstream from mouth and 8 miles northeast of Melstrand.		1979-80	10-10-79 05-09-80 08-20-80	30.5 31.3 23.0
04044775	Sevenmile Creek near Grand Marais, MI	Lat 46°37'15", long 86°15'31", in NW¼NW¼, sec. 25, T.49 N., R.16 W., Alger County, 100 ft upstream from mouth and 13.5 miles west of Grand Marais.		1979-80	05-06-80 08-18-80	19.5 17.0
04044782	Sullivan Creek near Grand Marais, MI	Lat 46°39'19", long 86°11'02", in NW¼SE¼ sec. 9, T.49 N., R.15 W., Alger County, at culvert 200 ft upstream from mouth on County Road H-58 and 9.5 miles west of Grand Marais.		1979-80	10-10-79 05-08-80 08-19-80	5.03 5.01 3.34
04044785	Hurricane River near Grand Marais, MI	Lat 46°39'48", long 86°09'57", in NW¼NE¼ sec. 10, T.49 N., R.15 W., Alger County, at culvert 0.2 mile upstream from mouth, on County Road H-58 and 8.5 miles west of Grand Marais.		1979-80	10-10-79 05-08-80 08-19-80	16.5 19.5 12.2
04044786	Sable Creek near Grand Marais, MI	Lat 46°40'03", long 86°01'01", in SW¼SE¼ sec. 2, T.49 N., R.14 W., Alger County, 150 ft upstream from path leading to Sable Falls and 1.5 miles southwest of Grand Marais.		1979-80	10-10-79 05-08-80 08-19-80	7.21 23.5 9.01
		Streams tributary to Lake Michigan				
04057400	Round Lake Outlet near Trenary, MI	Lat 46°09'42", long 86°44'51", in SW¼ sec. 36, T.44 N., R.20 W., Alger County, at culvert on county road at outlet of Round Lake, 5 miles west of FFH 13, and 11 miles southeast of Trenary.	5.50	1978-80	10-10-79 01-15-80 05-22-80 05-22-80 09-04-80	2.92 4.41 b.07 b3.23 2.67
04057580	Whitefish River near Rapid River, MI	Lat 45°57'56", long 86°55'15", in SE¼NW¼ sec. 10, T.41 N., R.21 W., Delta County, about 800 ft downstream from Chippeny Creek, 3.5 miles northeast of Rapid River.	284	1973-80	01-15-80 05-22-80 09-04-80	186 188 127

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Michigan--Continued				
04058120	Green Creek near Palmer, MI	Lat 46°22'22", long 87°36'21", in NW¼ sec. 19, T.46 N., R.26 W., Marquette County, at bridge on County Highway 565, 4.5 miles south of Palmer.	d8.42	1961-65 1970-80	11-29-79 02-27-80 05-27-80 08-27-80	b36.3 b13.0 b4.22 b6.97
04058250	Warner Creek tributary near Palmer, MI	Lat 46°25'20", long 87°36'09", in NW¼SE¼ sec. 31, T.47 N., R.26 W., Marquette County, at double culvert on County Road 565, 0.3 mile upstream from mouth and 0.8 mile south of Palmer.	4.05	1972-80	10-30-79 11-29-79 12-18-79 01-30-80 02-27-80 03-26-80 04-30-80 05-27-80 06-18-80 08-05-80 08-27-80 09-25-80	b9.26 b3.21 b1.97 b1.79 b1.55 b2.97 b2.65 b.59 b.76 b7.95 b1.25 b2.37
04058300	Warner Creek near Palmer, MI	Lat 46°24'09", long 87°32'39", in NW¼ sec. 10, T.46 N., R.26 W., Marquette County, 10 ft upstream from bridge on county highway, 0.1 mile upstream from confluence with Schweitzer Creek, and 3.5 miles southeast of Palmer.	14.2	1961-68† 1970-72d 1972-78† 1979-80	05-21-80 08-12-80	b11.7 b4.69
04065580	Mounty's Creek near Merriman, MI	Lat 45°56'41", long 87°59'23", in SW¼SW¼ sec. 18, T.41 N., R.29 W., Dickinson County, 400 ft upstream from mouth, and 3.6 miles northeast of Merriman.	2.96	1971-80	09-19-79 01-02-80 03-20-80 06-20-80	3.77 11.3 6.96 4.78
04065590	Steel Creek near Merriman, MI	Lat 45°56'31", long 87°59'33", in NE¼NE¼ sec. 24, T.41 N., R.30 W., Dickinson County, 200 ft upstream from mouth, 3.6 miles northeast of Merriman.	3.52	1971-80	09-19-79 01-02-80 03-20-80 06-20-80	1.11 1.23 2.27 1.45
04096517	Hog Creek tributary near Allen, MI	Lat 41°57'33", long 84°49'33", in SW¼SW¼ sec. 7, T.6 S., R.4 W., Hillsdale County, at Squires Road, 0.3 mile upstream from mouth, 3.0 miles west of Allen.	2.61	1969-80	10-05-79 05-14-80 06-25-80 07-30-80 09-03-80	1.78 5.60 1.56 1.83 8.02
04101700	Dowagiac Drain near Decatur, MI	Lat 42°04'26", long 86°01'51", in SW¼ sec. 35, T.4 S., R.15 W., Van Buren County, at bridge on 50th Street, 3.7 miles southwest of Decatur.	21.9	1962-64, 1980	04-24-80 05-05-80 06-02-80 07-07-80 08-04-80 09-02-80	44.8 38.0 38.7 50.6 29.8 32.3
04101710	Lake of the Woods Drain near Decatur, MI	Lat 42°05'05", long 86°02'17", in NE¼ sec. 34, T.4 S., R.15 W., Van Buren County, at culvert at 92nd Avenue, 3.5 miles southwest of Decatur.	13.1	1962-64, 1980	04-24-80 05-07-80 06-02-80 07-07-80 08-04-80 09-02-80	18.5 11.7 13.6 20.7 13.0 12.9
04102148	South Branch Paw Paw River near Paw Paw, MI	Lat 42°12'02", long 85°54'05", in NE¼ sec. 23, T.3 S., R.14 W., Van Buren County, at 60th Avenue, 1.4 miles south of Paw Paw.	51.2	1980	04-23-80 05-08-80 06-02-80 07-07-80 08-04-80 09-02-80	76.5 65.1 66.4 74.0 90.0 88.3
04102178	East Branch Paw Paw River near Lawton, MI	Lat 42°41'50", long 85°50'33", in NW¼ sec. 21, T.3 S., R.13 W., Van Buren County, at 30th Street, 1.5 miles north of Lawton.	26.9	1966, 1980	04-23-80 05-08-80 06-02-80 07-07-80 08-04-80 09-02-80	25.6 23.0 31.1 24.0 41.9 47.9
04102180	East Branch Paw Paw River at Paw Paw, MI	Lat 42°12'45", long 85°53'15", in sec. 13, T.3 S., R.14 W., Van Buren County, at bridge on State Highway 40 at Paw Paw.	31.5	1962-64, 1980	04-23-80 05-08-80 06-02-80 07-07-80 08-05-80 09-02-80	36.5 36.0 43.8 35.7 54.2 60.7
04102192	South Branch Paw Paw River at Paw Paw, MI	Lat 42°14'06", long 85°53'10", in SE¼ sec. 1, T.3 S., R.14 W., Van Buren County, at 51st Avenue, 1.0 mile north of Paw Paw.	94.3	1980	04-24-80 05-08-80 06-03-80 07-08-80 08-05-80 09-02-80	113 94.8 b193 118 133 179
04102212	North Branch Paw Paw River near Paw Paw, MI	Lat 42°16'39", long 85°51'48", in SW¼ sec. 20, T.2 S., R.13 W., Van Buren County, at bridge on 32nd Street, 4.3 miles northeast of Paw Paw.	37.8	1980	04-24-80 05-08-80 06-03-80 07-08-80 08-05-80 09-03-80	55.2 47.4 b105 53.2 92.1 85.0

See footnotes at end of table.

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04102217	Unnamed tributary to North Branch Paw Paw River near Paw Paw, MI	Lat 42°15'48", long 85°51'49", in SW¼ sec. 29, T.2 S., R.13 W., Van Buren County, at 32nd Street, 3.5 miles northeast of Paw Paw.	17.6	1980	04-24-80	15.6
					05-08-80	12.6
					06-03-80	b24.8
					07-08-80	12.6
					08-05-80	16.3
					09-03-80	15.1
04102260	Brandywine Creek near Paw Paw, MI	Lat 42°16'50", long 85°53'53", in NE¼ sec. 23, T.2 S., R.14 W., Van Buren County, at bridge on 38th Avenue, 4.4 miles north of Paw Paw.	32.2	1962-64, 1980	04-24-80	21.1
					05-08-80	12.1
					06-03-80	b89.2
					07-09-80	10.1
					08-05-80	27.4
					09-03-80	36.5
04102370	Brush Creek at Lawrence, MI	Lat 42°13'10", long 86°02'36", in SW¼ sec. 10, T.3 S., R.15 W., Van Buren County, at bridge on Red Arrow Highway at Lawrence.	39.9	1962-64, 1980	04-24-80	37.6
					05-09-80	31.0
					06-03-80	b81.1
					07-09-80	36.9
					08-06-80	32.2
					09-04-80	31.3
04102392	Paw Paw River at Lawrence, MI	Lat 42°13'26", long 86°03'06", in NE¼ sec. 9, T.3 S., R.15 W., Van Buren County, at 52nd Street in Lawrence.	265	1980	04-24-80	377
					05-09-80	261
					06-05-80	b469
					07-09-80	346
					08-06-80	528
					09-04-80	356
04102540	Brandywine Creek near Covert, MI	Lat 42°18'54", long 86°18'27", in NE¼ sec. 8, T.2 S., R.17 W., Van Buren County, at bridge on old U.S. Highway 31, 2.7 miles northwest of Covert.	16.7	1962-64, 1980	04-24-80	12.5
					05-07-80	7.85
					06-06-80	b107
					07-11-80	6.65
					08-08-80	13.9
					09-05-80	7.54
04102545	Deerlick Creek near South Haven, MI	Lat 42°22'23", long 86°17'07", in NE¼ sec. 21, T.1 S., R.17 W., Van Buren County, at 76th Street, 2.0 miles south of South Haven.	7.76	1962-64, 1980	04-24-80	3.54
					05-07-80	1.88
					06-06-80	b82.7
					07-11-80	.84
					08-08-80	4.19
					09-05-80	2.00
04102575	Black River Drain near Bangor, MI	Lat 42°20'40", long 86°03'12", in NW¼ sec. 34, T.1 S., R.15 W., Van Buren County, above confluence with Haven and Max Lake Drain, 125 feet upstream from 52nd Road, 3.8 miles northeast of Bangor.	23.6	1962-64, 1980	04-24-80	26.1
					05-06-80	19.8
					06-09-80	bg332
					07-10-80	17.3
					08-07-80	23.2
					09-04-80	30.3
04102590	Haven and Max Lake Drain near Bangor, MI	Lat 42°20'50", long 86°03'10", in SW¼ sec. 27, T.1 S., R.15 W., Van Buren County, at culvert on 20th Road, 4.0 miles northeast of Bangor.	16.8	1962-64, 1980	04-24-80	19.8
					05-06-80	10.8
					06-09-80	b112
					07-10-80	9.04
					08-07-80	24.4
					09-04-80	26.2
04102618	Black River at Bangor, MI	Lat 42°18'56", long 86°06'48", in NE¼ sec. 12, T.2 S., R.16 W., Van Buren County, at bridge on Railroad Street at Bangor.	52.4	1980	04-24-80	64.5
					05-06-80	47.6
					06-09-80	b393
					07-10-80	42.8
					08-07-80	60.3
					09-04-80	82.3
04102720	Cedar Creek near South Haven, MI	Lat 42°21'15", long 86°11'17", in NW¼ sec. 29, T.1 S., R.16 W., Van Buren County, at bridge on 16th Street, 4.6 miles southeast of South Haven.	17.6	1962-64, 1980	04-24-80	15.4
					05-07-80	10.4
					06-09-80	b115
					07-11-80	8.55
					08-07-80	22.8
					09-05-80	13.3
04102731	Black River near South Haven, MI	Lat 42°25'10", long 86°14'24", in NW¼ sec. 1, T.1 S., R.17 W., Van Buren County, at 71.5 Street, 1.0 mile east of South Haven.	132	1980	04-23-80	118
					05-07-80	82.6
					06-11-80	b557
					07-11-80	31.9
					08-08-80	182
					09-05-80	101

See footnotes at end of table.

DISCHARGE AT PARTIAL-RECORD STATIONS AND MISCELLANEOUS SITES

Discharge measurements made at low-flow partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
04115450	Fish Creek at Carson City, MI	Lat 43°10'40", long 84°51'24", in SW¼ sec. 12, T.9 N., R.5 W., Montcalm County, on downstream side of footbridge in park, 300 ft upstream of bridge on State Highway 57, at Carson City.	126	1974-80	10-31-79	37.8
					05-19-80	b140
					07-30-80	48.8
					09-04-80	40.3
04119061	Plaster Creek at Wyoming, MI	Lat 42°56'15", long 85°41'24", NE¼ sec. 2, T.6 N., R.12 W., Kent County, at Godfrey St., at Wyoming.	57.1	1974-80	03-12-80	36.8
					05-08-80	24.5
					06-18-80	31.6
					08-18-80	16.0
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NE¼NW¼ sec. 1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon, and 4.9 miles upstream from mouth.	a39	1974-80	03-11-80	46.0
					06-18-80	50.6
					09-23-80	b99.0
*04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼NE¼ sec. 31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75† 1978-80	04-23-80	219
					07-22-80	193
					09-25-80	215
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼NW¼ sec. 2, T.25 N., R.15 W., Benzie County, at bridge on highway U.S. 31, 1.2 miles south of Benzonia, and 1.4 miles downstream from Homestead Dam.	a170	1974-80	03-26-80	b301
					07-21-80	212
04126610	Crystal Lake Outlet near Benzonia, MI	Lat 44°37'56", long 86°08'41", in NW¼NE¼ sec. 29, T.26 N., R.15 W., Benzie County, at culvert on State Highway 115, 0.3 mile downstream from dam at outlet of Crystal Lake, and 2.5 miles west of Benzonia.	a32	1974-80	07-21-80	b46.7
					09-24-80	2.21
04126755	Platte River at M-22 near Honor, MI	Lat 44°42'39", long 86°07'08", in NE¼SE¼ sec. 28, T.27 N., R.15 W., Benzie County, at bridge on State Highway 22, 0.4 mile downstream from Platte Lake and 6.2 miles northwest of Honor.	166	1946-48 1957 1979-80	10-29-79	183
					05-15-80	158
					06-02-80	be134
					06-30-80	be157
					08-04-80	e122
					08-28-80	119
					09-02-80	e119
04126758	Platte River at Weir on Loon Lake Outlet near Honor, MI	Lat 44°43'12", long 86°08'12", in SW¼SW¼ sec. 21, T.27 N., R.15 W., Benzie County, at Department of Natural Resources fish weir, 0.6 mile downstream of Loon Lake and 7.2 miles northwest of Honor.	169	1979-80	10-29-79	190
					05-15-80	173
					08-28-80	122
04126767	Otter Creek at Aral Road near Empire, MI	Lat 44°45'42", long 86°04'26", in SW¼SW¼ sec. 1, T.27 N., R.15 W., Benzie County, at culverts on Aral Road, 0.1 mile upstream from mouth and 3.5 miles south of Empire.	9.55	1979-80	10-30-79	17.7
					05-12-80	16.4
					08-28-80	14.8
04126802	Crystal River near Glen Arbor, MI	Lat 44°54'10", long 85°57'46", in SE¼NE¼ sec. 23, T.29 N., R.14 W., Leelanau County, at culverts on County Highway 675, 3.7 miles upstream from mouth and 1.4 miles east of Glen Arbor.	42.0	1979-80	10-30-79	54.9
					05-14-80	54.1
					08-27-80	23.1
04126810	Shalda Creek near Glen Arbor, MI	Lat 44°56'48", long 85°53'07", in SE¼NW¼ sec. 4, T.29 N., R.13 W., Leelanau County, at culverts on Lake Michigan Road, 0.1 mile upstream from mouth and 6.2 miles northeast of Glen Arbor.	33.8	1979-80	10-30-79	26.6
					05-14-80	28.3
					08-26-80	17.1
		Streams tributary to Lake Huron				
04146450	North Branch Flint River near Columbiaville, MI	Lat 43°11'18", long 83°22'03", in NW¼ sec. 24, T.9 N., R.9 E., Lapeer County, on downstream side of bridge on Barnes Lake Road.		1979-80	10-11-79	21.8
					05-06-80	b162
					06-18-80	63.1
					07-23-80	44.7
					08-27-80	41.1
		Streams tributary to St. Clair River				
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec. 9, T.5 N., R.16 E., St. Clair County, at bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-80	10-02-79	.66
					05-14-80	b79.7
					07-08-80	6.23
					09-10-80	2.66

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* Also a crest-stage station.
† Operated as a continuous-record gaging station.
a Approximately.
b Not base flow.
c Operated as a crest-stage partial-record station.
d Since 1970, affected by diversion for industrial use.
e Discharge measurement made by employees of Michigan Department of Natural Resources.
f Field estimate.
g Discharge includes the flow in Haven and Max Lake Drain.

Crest-stage partial-record stations

The following table contains annual maximum discharge for crest-stage stations. A crest-stage gage is a device which will register the peak stage occurring between inspections of the gage. A stage-discharge relation for each gage is developed from discharge measurements made by indirect measurements of peak flow or by current meter. The date of the maximum discharge is not always certain, but is usually determined by comparison with nearby continuous-record stations, weather records, or local inquiry. Only the maximum discharge for each water year is given. Information on some lower floods may have been obtained but is not published herein. The years given in the period of record represent water years for which the annual maximum has been determined.

Annual maximum discharge at crest-stage partial-record stations during water year 1980

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Superior					
*04032000	Presque Isle River near Tula, MI	Lat 46°32'49", long 89°46'38", in NW¼ sec.23, T.48 N., R.44 W., Gogebic County, at bridge on State Highway 28, 7 miles southwest of Merriweather, 5.5 miles downstream from Little Presque Isle River, and 2.0 miles east of Tula.	261	1945-73‡, 1974-80	04-22-80	10.21	1,940
04039500	South Branch Ontonagon River at Ewen, MI	Lat 46°31'58", long 89°16'37", in NW¼ sec. 26, T.48 N., R.40 W., Ontonagon County, on piers of old State Highway 28 bridge, at Ewen.	348	1939-41, 1942-71‡, 1972-80	04-08-80	12.46	2,830
04041000	Perch River near Sidnaw, MI	Lat 46°31'06", long 88°39'48", in NE¼ sec.34, T.48 N., R.35 W., Baraga County, at State Highway 28, 2.5 miles east of Sidnaw.	63.1	1913-15‡, 1957-80	04-22-80	9.01	323
04044200	Carp Creek at Ishpeming, MI	Lat 46°29'11", long 87°41'21", in NW¼ sec.9, T.47 N., R.27 W., Marquette County, at bridge on Highway 41A, at Ishpeming.	16.5	1970-80	10-23-79	8.02	174
04044813	Two Hearted River near Paradise, MI	Lat 46°41'57", long 85°25'19", in NW¼ SW¼ sec.27, T.50 N., R.9 W., Luce County, at foot bridge in State Forest Campground, 0.4 mile upstream from mouth, and 18 miles northwest of Paradise.	201	1973-80	04-12-80	--	a3,100
04045538	West Branch Waiska River near Brimley, MI	Lat 46°21'18", long 84°35'35", in SW¼ NW¼ sec.29, T.46 N., R.2 W., Chippewa County, at bridge on county road, 3.2 miles upstream from mouth, and 3.5 miles south of Brimley.	40.7	1973-80	04-09-80	9.18	1,190
04045559	East Branch Waiska River near Brimley, MI	Lat 46°25'07", long 84°28'24", in NW¼ NE¼ sec.6, T.46 N., R.1 W., Chippewa County, at bridge on county road, 4.0 miles upstream from mouth, and 4.7 miles east of Brimley.	31.9	1973-80	04-09-80	13.62	1,130
		Streams tributary to Lake Michigan					
04046000	Black River near Garnet, MI	Lat 46°07'05", long 85°21'55", in SE¼ sec.13, T.43 N., R.9 W., Mackinac County, on right bank 10 ft upstream from foot bridge, 15 ft downstream from Peters Creek, 3.5 miles upstream from Lake Michigan and 4 miles southwest of Garnet.	28.0	1951-78‡, 1979-80	04-09-80	6.01	380
04049500	Manistique River at Germfask, MI	Lat 46°14'00", long 85°55'40", in SE¼ sec.4, T.44 N., R.13 W., Schoolcraft County, 600 feet upstream from bridge on State Highway 77, 1.0 mile south of Germfask.	341	1938-70‡, 1971-80	04-09-80	5.51	1,290
04057000	Indian River near Manistique, MI	Lat 45°59'30", long 86°17'15", in NE¼ sec.34, T.42 N., R.16 W., Schoolcraft County, at outlet of Indian Lake, 2.4 miles northwest of Manistique.	302	1938-71‡, 1972-80	04-15-80	4.95	710
04057900	Black River near Republic, MI	Lat 46°25'08", long 87°53'21", in NE¼ sec.2, T.46 N., R.29 W., Marquette County, at bridge on county road, 4.4 miles east of Republic.	34.4	1961-68‡, 1970-80	04-10-80	3.62	260
04059400	Ten mile Creek at Perronville, MI	Lat 45°48'38", long 87°22'00", in NW¼ NW¼ sec.2, T.39 N., R.25 W., Delta County, 1 mile northwest of Perronville.	38.4	1971-77‡, 1978-80	04-09-80	4.15	318
04062200	Peshekee River near Champion, MI	Lat 46°33'25", long 88°00'09", in NW¼ sec.13, T.48 N., R.30 W., Marquette County, on left bank 10 ft downstream from bridge on County Road 607, 0.6 mile downstream from West Branch and 3.5 miles northwest of Champion.	133	1961-78‡, 1979-80	04-25-80	5.96	2,070
04062300	Michigamme River at Republic, MI	Lat 46°23'03", long 87°58'48", in SE¼ sec. 18, T.46 N., R.29 W., Marquette County, on left bank 400 feet upstream from county highway bridge, 0.3 mile upstream from Trout Falls Creek, and 0.6 mile south of Republic.	240	1961-75‡, 1976-80	04-25-80	4.83	1,640

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04096272	Beebe Creek near Hillsdale, MI	Lat 41°57'15", long 84°38'20", in NE¼ NE¼ sec.15, T.6 S., R.3 W., Hillsdale County, 20 ft upstream from bridge on Moore Road, 1.2 miles northwest of Hillsdale.	42.4	1975-78‡, 1979-80	03-18-80	6.37	354
04096340	St. Joseph River at Clarendon, MI	Lat 42°07'51", long 84°51'56", in SW¼ SW¼ sec.11, T.4 S., R.5 W., Calhoun County, on left bank 5 ft upstream from bridge on 22 Mile Road at Clarendon.	144	1975-77‡, 1978-80	04-04-80	6.89	497
04097170	Portage River near Vicksburg, MI	Lat 42°06'53", long 85°29'08", in SW¼ sec.16, T.4 S., R.10 W., Kalamazoo County, on right bank 15 ft upstream from bridge on W Ave., 2.4 miles east of Vicksburg.	68.2	1947-51‡ 1965-79‡ 1980	06-08-80	5.23	222
04098500	Fawn River near White Pigeon, MI	Lat 41°46'56", long 85°35'00", in SW¼ sec.10, T.8 S., R.11 W., St. Joseph County, on right bank 0.3 mile downstream from bridge on county highway, 3.1 miles east of White Pigeon, and 3.5 miles upstream from Sherman Mill Creek.	192	1958-75‡, 1976-80	04-12-80	4.14	461
04102000	St. Joseph River at Berrien Springs, MI	Lat 41°56'56", long 86°20'02", in SW¼ sec.18, T.6 S., R.17 W., Berrien County, at bridge on U.S. Highway 33, at Berrien Springs, and at mile 24.	4,081	1902-06‡, 1909-31‡, 1951-56‡, 1979-80	06-09-80	8.55	8,580
04108645	Rabbit River at Hamilton, MI	Lat 42°40'31", long 86°00'13", in NE¼ sec.6, T.3 N., R.14 W., Allegan County, at bridge on State Highway 40, at Hamilton.	274	1979-80	12-25-79	14.43	1,470
04112700	Sycamore Creek near Mason, MI	Lat 42°36'38", long 84°27'58", in NE¼ NE¼ sec.31, T.3 N., R.1 W., Ingham County, at bridge on Harper Road, 0.7 mile downstream from Aurelius and VeVoy Drain, and 2.6 miles northwest of Mason.	39.5	1975-80	08-21-80	9.17	235
04113090	Carrier Creek near Grand Ledge MI	Lat 42°43'36", long 84°39'16", in SE¼ SW¼ sec.15, T.4 N., R.3 W., Eaton County, at bridge on St. Joe Highway, 3.7 miles upstream from mouth, and 4.0 miles southeast of Grand Ledge.	7.18	1975-80	08-20-80	6.07	157
04117000	Quaker Brook near Nashville, MI	Lat 42°33'57", long 85°05'37", in NW¼ sec.13, T.2 N., R.7 W., Barry County, on left bank 150 feet upstream from culvert on county road, 500 feet upstream from small tributary, and 2.5 miles south of Nashville.	7.60	1955-75‡, 1976-80	08-03-80	4.78	169
04119055	Plaster Creek at Grand Rapids, MI	Lat 42°54'46", long 85°39'02", in SE¼ sec.7, T.6 N., R.11 W., Kent County, on right downstream side of bridge on 28th Street, at Grand Rapids.	46.6	1974-80	12-25-79	7.88	520
04119160	Buck Creek at Grandville, MI	Lat 42°54'09", long 85°45'46", in SE¼ sec.18, T.6 N., R.12 W., Kent County, on right downstream side of bridge on Wilson Avenue, at Grandville.	50.5	1974-80	12-25-79	7.42	435
*04120295	Black Creek near Muskegon, MI	Lat 43°12'14", long 86°09'52", in NW¼ NW¼ sec.1, T.9 N., R.16 W., Muskegon County, at bridge on Mill Iron Road, 4.8 miles east of Muskegon.	b39	1974-80	08-21-80	3.20	180
04122025	Muskegon River at Bridgeton, MI	Lat 43°20'50", long 85°56'22", in SE¼ NE¼ sec.14, T.11 N., R.14 W., Newaygo County, at bridge on Warner Road, in Bridgeton.	--	1979-80	03-22-80	12.79	4,700
04122223	Pentwater River near Hart, MI	Lat 43°43'27", long 86°22'36", in NW¼ SW¼ sec.5, T.15 N., R.17 W., Oceana County, at culverts on county road, 0.8 mile downstream from hydroelectric plant on Hart Lake, 1.8 miles northwest of Hart.	b78	1975-80	09-20-80	3.93	305
04122230	North Branch Pentwater River near Pentwater, MI	Lat 43°47'42", long 86°21'30", in NE¼ SE¼ sec.8, T.16 N., R.17 W., Oceana County, at bridge on U.S. Highway 31, 3.5 miles northeast of Pentwater.	b44	1975-80	09-20-80	3.20	314

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of record	Annual maximum Date	Annual maximum Gage height (feet)	Annual maximum Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued					
04123500	Manistee River near Grayling, MI	Lat 44°41'35", long 84°50'50", in SW¼ NW¼ sec.31, T.27 N., R.4 W., Crawford County, on right bank 25 feet upstream from bridge on State Highway 72, 6.8 miles northwest of Grayling.	131	1942-73‡, 1974-80	04-10-80	1.23	278
04124500	East Branch Pine River near Tustin, MI	Lat 44°06'09", long 85°31'02", in NE¼ NW¼ sec.28, T.20 N., R.10 W., Osceola County, 75 feet downstream from highway bridge, 3.0 miles west of Tustin.	b63	1953-63‡, 1964-80	04-09-80	4.11	206
*04126200	Little Manistee River near Freesoil, MI	Lat 44°11'00", long 86°10'00", in NE¼ NE¼ sec.31, T.21 N., R.15 W., Manistee County, on right bank 25 feet upstream from Six Mile Bridge, 5.8 miles north of Freesoil, 7.4 miles upstream from mouth, and 9.0 miles southeast of Manistee.	200	1956-75‡, 1976-80	04-10-80	2.78	351
*04126600	Betsie River near Benzonia, MI	Lat 44°36'02", long 86°05'57", in NW¼ NW¼ sec.2, T.25 N., R.15 W., Benzie County, at bridge on U.S. Highway 31, 1.2 miles south of Benzonia.	b170	1975-80	04-10-80	4.06	940
04127850	Boyne River near Boyne City, MI	Lat 45°11'48", long 84°57'26", in NW¼ SW¼ sec.5, T.32 N., R.5 W., Charlevoix County, at culvert on Dam Road, 0.3 mile downstream from nonoperative hydroelectric plant, 2.8 miles southeast of Boyne City.	b65	1975-80	04-09-80	3.34	416
		Streams tributary to Lake Huron					
04131500	Rainy River near Ocqueoc, MI	Lat 45°24'30", long 84°10'45", in NE¼ NW¼ sec.22, T.35 N., R.2 E., Presque Isle County, at bridge on North Allis Highway, 4.4 miles west of Ocqueoc, and 5.0 miles upstream from Black Lake.	b85	1952-79‡, 1980	04-10-80	4.69	428
04132500	Thunder Bay River near Hillman, MI	Lat 45°00'30", long 83°58'21", in NE¼ SE¼ sec.8, T.30 N., R.4 E., Montmorency County, on left bank 25 feet upstream from bridge on State Highway 32, 5.2 miles southwest of Hillman.	232	1946-72‡, 1973-80	04-08-80	7.66	655
04138000	East Branch Au Gres River at McIvor, MI	Lat 44°13'57", long 83°42'03", in NW¼ NW¼ sec.10, T.21 N., R.6 E., Iosco County, on right bank 25 feet downstream from bridge on Whittemore Road at McIvor, and 11.5 miles upstream from mouth.	b84	1950-73‡, 1974-80	03-20-80	c6.02	270
04139000	Houghton Creek near Lupton, MI	Lat 44°23'45", long 84°02'50", in SE¼ SE¼ sec.10, T.23 N., R.3 E., Ogemaw County, 2.7 miles southwest of Lupton.	29.7	1950-72‡, 1973-80	04-09-80	4.76	236
04140200	Klacking Creek near Selkirk, MI	Lat 44°20'05", long 84°08'46", in NE¼ NE¼ sec.2, T.22 N., R.2 E., Ogemaw County, at bridge on Campbell Road, 4.0 miles northwest of Selkirk.	7.51	1953-80	04-09-80	1.38	61
04141000	South Branch Shepards Creek near Selkirk, MI	Lat 44°18'28", long 84°05'13", in SE¼ SE¼ sec.8, T.22 N., R.3 E., Ogemaw County, on right bank 200 feet upstream from mouth, 600 feet west of bridge on Bedtelyon Road, and 1.1 miles southwest of Selkirk.	1.15	1951-78‡, 1979-80	04-10-80	3.16	38
04144180	Jones Creek near Gaines, MI	Lat 42°53'02", long 83°52'27", in SE¼ sec.28, T.6 N., R.5 E., Genesee County, at bridge on Baldwin Road, 1.7 miles northeast of Gaines.	7.60	1970-80	03-17-80	d5.10	52
04144200	Porter Drain near Gaines, MI	Lat 42°53'26", long 83°50'59", in SE¼ sec.27, T.6 N., R.5 E., Genesee County, at bridge on Seymour Road, 3.2 miles east of Gaines.	4.68	1970-80	03-17-80	3.69	52
04144220	Jones Creek at Duffield, MI	Lat 42°54'45", long 83°54'27", in SE¼ sec.17, T.6 N., R.5 E., Genesee County, at bridge on Grand Blanc Road, 1.0 mile south of Duffield.	23.4	1970-80	03-17-80	7.30	267
04146020	South Branch Flint River near Millville, MI	Lat 43°04'44", long 83°18'25", in SE¼ sec.29, T.8 N., R.10 E., Lapeer County, on downstream right wingwall of bridge on Saginaw Road, 1.6 miles north of Lapeer.	160	1974-80	04-06-80	7.59	600

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04147800	Powers-Cullen Drain near Genesee, MI	Lat 43°05'33", long 83°33'31", in SW¼ sec.18, T.8 N., R.8 E., Genesee County, at bridge on Coldwater Road, 3.3 miles southeast of Genesee.	9.17	1970-80	03-17-80	c3.20	e90
04147900	Lefler-Scothan Drain near Otisville, MI	Lat 43°08'11", long 83°32'27", in NE¼ sec.5, T.8 N., R.8 E., Genesee County, at bridge on Frances Road, 2.2 miles south of Otisville.	4.90	1970-80	04-04-80	4.41	61
04148120	Kearsley Creek near Atlas, MI	Lat 42°57'15", long 83°32'42", in NE¼ sec.5, T.6 N., R.8 E., Genesee County, at bridge on Jordan Road, 1.2 miles north of Atlas.	55.6	1970-80	03-17-80	6.86	234
04148139	Black Creek near Davison, MI	Lat 43°01'28", long 83°33'24", in SE¼ sec.7, T.7 N., R.8 E., Genesee County, at bridge on Irish Road, 2.0 miles west of Davison.	22.8	1970-80	03-17-80	c6.57	120
04148144	Chipmunk Creek near Genesee, MI	Lat 43°04'01", long 83°36'59", in SE¼ sec.27, T.8 N., R.7 E., Genesee County, at bridge on Genesee Road, 3.1 miles south of Genesee.	5.49	1970-80	04-04-80	3.18	63
04148200	Swartz Creek near Holly, MI	Lat 42°49'39", long 83°37'42", in SW¼ sec.15, T.5 N., R.7 E., Oakland County, on right bank 25 feet downstream from bridge on Elliot Road, 2.4 miles north of Holly.	12.1	1956-75‡, 1976-80	04-04-80	2.87	44
04148255	Swartz Creek near Grand Blanc, MI	Lat 42°53'09", long 83°41'29", in SE¼ sec.25, T.6 N., R.6 E., Genesee County, at bridge on Baldwin Road, 4.1 miles southwest of Grand Blanc.	36.0	1970-80	04-04-80	4.45	92
04148260	Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°45'43", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.9 miles east of Swartz Creek.	67.3	1970-80	04-04-80	f5.96	323
04148265	Kimball Drain near Swartz Creek, MI	Lat 42°55'15", long 83°49'51", in NE¼ sec.14, T.6 N., R.5 E., Genesee County, at bridge on Morrish Road, 2.4 miles south of Swartz Creek.	10.6	1970-80	04-04-80	g5.17	120
04148270	West Branch Swartz Creek near Swartz Creek, MI	Lat 42°58'22", long 83°46'08", in SW¼ sec.28, T.7 N., R.6 E., Genesee County, at bridge on Bristol Road, 3.2 miles east of Swartz Creek.	40.6	1970-80	04-04-80	h6.32	302
04148410	Thread Creek near Goodrich, MI	Lat 42°53'19", long 83°32'10", in SE¼ sec.29, T.6 N., R.8 E. Genesee County, at bridge on Baldwin Road, 2.4 miles southwest of Goodrich.	28.8	1970-80	04-04-80	3.64	127
04148610	Cole Creek near Flushing, MI	Lat 43°02'44", long 83°51'06", in SW¼ sec.35, T.8 N., R.5 E., Genesee County, at bridge on Potter Road, 1.2 miles south of Flushing.	8.51	1970-80	04-04-80	5.03	84
04148620	Freeman Drain near Montrose, MI	Lat 43°07'04", long 83°53'37", in SE¼ sec.5, T.8 N., R.5 E., Genesee County, at bridge on Mt. Morris Road, 4.0 miles south of Montrose.	8.21	1970-80	07-27-80	5.33	194
04148640	Armstrong Creek near Montrose, MI	Lat 43°08'04", long 83°50'03", in SE¼ sec.35, T.9 N., R.5 E., Genesee County, at bridge on Morrish Road, 4.1 miles southeast of Montrose.	11.9	1970-80	05-18-80	i5.36	145
04148740	Central-Stadler Drain near Montrose, MI	Lat 43°09'46", long 83°50'14", in SE¼ sec.23, T.9 N., R.5 E., Genesee County, at bridge on Wilson Road, 3.1 miles east of Montrose.	15.0	1970-80	03-18-80	j3.63	86
04148800	Pine Run near Montrose, MI	Lat 43°12'42", long 83°48'54", in SE¼ sec.1, T.9 N., R.5 E., Genesee County, at bridge on Elms Road, 4.7 miles northeast of Montrose.	28.2	1970-80	09-23-80	k6.54	246
04148900	Silver Creek near Clio, MI	Lat 43°12'54", long 83°45'55", in NW¼ sec.4, T.9 N., R.6 E., Genesee County, at bridge on Weir Road, 3.0 miles northwest of Clio.	3.70	1970-80	09-23-80	3.20	60

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi²)	Period of Record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued					
04149300	Misteguay Creek near Flushing, MI	Lat 43°01'31", long 83°54'41", in NE¼ sec.7, T.7 N., R.5 E., Genesee County, at bridge on Duffield Road, 3.7 miles southwest of Flushing.	17.3	1970-80	09-22-80	8.06	490
04151000	Cass River at Vassar, MI	Lat 43°22'15", long 83°34'52", in NW¼ SW¼ sec.7, T.11 N., R.8 E., Tuscola County, at bridge on State Highway 15, at Vassar.	710	1949-70‡, 1971-80	04-16-80	9.39	3,610
04153500	Salt River near North Bradley, MI	Lat 43°42'10", long 84°28'14", in NE¼ SE¼ sec.7, T.15 N., R.1 W., Midland County, at bridge on North Saginaw Road, 1.1 miles southeast of North Bradley.	138	1935-71‡, 1972-80	04-09-80	7.69	617
		Streams tributary to St. Clair River					
*04160350	Pine River near Rattle Run, MI	Lat 42°52'49", long 82°34'04", in NE¼ sec.9, T.5 N., R.16 E., St. Clair County, on right downstream wingwall of bridge on Gratiot Road, 1.9 miles northeast of Rattle Run.	135	1974-80	04-04-80	18.14	2,080
		Streams tributary to Lake St. Clair					
04161500	Paint Creek near Lake Orion, MI	Lat 42°46'03", long 83°13'12", in NE¼ sec.13, T.4 N., R.10 E., Oakland County, on left bank 100 feet upstream from railroad bridge, 1.6 miles southeast of Lake Orion, and 2.8 miles upstream from Trout Creek.	38.5	1959-75‡, 1976-80	04-04-80	2.89	121
04161760	West Branch Stony Creek near Washington, MI	Lat 42°43'53", long 83°06'02", in SE¼ sec.25, T.4 N., R.11 E., Oakland County, at bridge on Huron-Clinton Metropolitan Park Road, and 3.4 miles west of Washington.	22.5	1965-80	03-17-80	m3.35	153
04164010	North Branch Clinton River at Almont, MI	Lat 42°54'59", long 83°02'42", in NE¼ sec.28, T.6 N., R.12 E., Lapeer County, at bridge on State Highway 53, at Almont.	9.56	1959-62, 1963-68‡, 1969-80	04-04-80	n4.56	194
04164050	North Branch Clinton River near Romeo, MI	Lat 42°49'11", long 82°58'35", in NW¼ sec.31, T.5 N., R.13 E., Macomb County, at bridge on 33 Mile Road, 2.2 miles northeast of Romeo.	49.7	1959-64, 1965-69‡, 1970-80	04-04-80	p3.40	620
04164150	North Branch Clinton River near Meade, MI	Lat 42°43'50", long 82°54'23", in NE¼ sec.34, T.4 N., R.13 E., Macomb County, on left bank at bridge on 27 Mile Road, 1.9 miles northwest of Meade.	89.6	1959-67, 1968-72‡, 1973-80	04-04-80	q6.25	990
04164200	Coon Creek near Armada, MI	Lat 42°47'41", long 82°52'58", in SW¼ sec.1, T.4 N., R.13 E., Macomb County, at bridge on North Road, 3.4 miles south of Armada.	10.0	1959-65, 1966-70‡, 1971-80	04-04-80	4.68	198
04164250	Tupper Brook at Ray Center, MI	Lat 42°45'42", long 82°54'04", in NW¼ sec.23, T.4 N., R.13 E., Macomb County, at bridge on 29 Mile Road, at Ray Center.	8.62	1959, 1960-64‡, 1965-80	04-04-80	6.54	345
04164350	Highbank Creek near Armada, MI	Lat 42°28'24", long 82°51'08", in NW¼ sec.6, T.4 N., R.14 E., Macomb County, at bridge on 32 Mile Road, 3.0 miles southeast of Armada.	14.9	1959-65, 1966-70‡, 1971-80	04-04-80	15.43	e700
04164360	East Branch Coon Creek near New Haven, MI	Lat 42°45'46", long 82°50'57", in NW¼ sec.19, T.4 N., R.14 E., Macomb County, at bridge on 29 Mile Road, 3.4 miles northwest of New Haven.	36.1	1959-66, 1967-72‡, 1973-80	04-04-80	r7.88	1,090
04164400	Deer Creek near Meade, MI	Lat 42°42'39", long 82°51'32", in NW¼ sec.6, T.3 N., R.14 E., Macomb County, at bridge on 25½ Mile Road, 0.9 mile southeast of Meade.	12.7	1959-60, 1961-65‡, 1966-80	03-17-80	6.48	312
04164450	McBride Drain near Macomb, MI	Lat 42°41'14", long 82°55'14", in NE¼ NE¼ sec.16, T.3 N., R.13 E., Macomb County, at bridge on 24 Mile Road, 2.2 miles southeast of Macomb.	5.79	1960-64‡, 1965-80	04-04-80	7.74	119
04164600	Middle Branch Clinton River near Macomb, MI	Lat 42°42'03", long 82°59'44", in SE¼ sec.2, T.3 N., R.12 E., Macomb County, at bridge on Schoenherr Road, 2.0 miles west of Macomb.	22.2	1959-64, 1965-69‡, 1971-80	08-21-80	9.24	468

See footnotes at end of table.

Annual maximum discharge at crest-stage partial-record stations during water year 1980--Continued

Station No.	Station name	Location	Drainage area (mi^2)	Period of record	Annual maximum		
					Date	Gage height (feet)	Discharge (ft^3/s)
		Streams tributary to Lake St. Clair --Continued					
04165200	Gloede Ditch near Waldenburg, MI	Lat 42°37'39", long 82°57'10", in SW¼ sec.32, T.3 N., R.13 E., Macomb County, 2.2 miles south of Waldenburg.	16.0	1959, 1960-64‡, 1965-80	04-04-80	15.98	333
		Streams tributary to Detroit River					
04167000	Middle River Rouge near Garden City, MI	Lat 42°20'55", long 83°18'45", in SW¼ NW¼ sec.6, T.2 S., R.10 E., Wayne County, on right bank 200 ft downstream from bridge on Inkster Road, 1.8 miles northeast of Garden City.	99.9	1931-33‡, 1948-77‡, 1978-80	04-04-80	8.67	944
04168660	Frank and Poet Drain at Trenton, MI	Lat 42°09'19", long 83°12'22", in NW¼ sec.13, T.4 S., R.10 E., Wayne County, at bridge on King Road, at Trenton.	19.3	1972-80	06-03-80	9.04	500
		Streams tributary to Lake Erie					
04168800	Huron River near Andersonville, MI	Lat 42°41'35", long 82°29'56", in NW¼ SE¼ sec.3, T.3 N., R.8 E., Oakland County, on downstream side of culvert on White Lake Road, 2.5 miles south of Andersonville.	14.0	1974-80	03-18-80	2.16	69
04173250	Mill Creek near Lima Center, MI	Lat 42°15'56", long 83°56'45", in NE¼ sec.34, T.2 S., R.4 E., Washtenaw County, at Guenther Road, 2.0 miles upstream from North Fork Mill Creek, and 2.2 miles south of Lima Center.	47.3	1973-80	03-18-80	9.03	450
04175960	South Branch River Raisin near Adrian, MI	Lat 41°55'03", long 84°00'37", in SE¼ sec.25, T.6 S., R.3 E., Lenawee County, at Howell Highway, 2.0 miles northeast of Adrian.	165	1979-80	12-25-79	10.10	1,270
04176000	River Raisin near Adrian, MI	Lat 41°54'15", long 83°58'50", in NW¼ sec.5, T.7 S., R.4 E., Lenawee County, at Academy Road, 1.7 miles east of Adrian.	463	1954-78‡, 1979-80	03-19-80	12.28	2,560
04176400	Saline River near Saline, MI	Lat 42°07'50", long 83°46'35", in SW¼ sec.18, T.4 S., R.5 E., Washtenaw County, on right bank 20 ft downstream from bridge on Maple Road, 2.8 miles south of Saline.	94.6	1966-77‡, 1978-80	06-03-80	10.66	1,070

‡ Operated as a continuous-record gaging station.
* Also a low-flow partial-record station.
a Based on correlation with E. Br. Two-Hearted River.
b Approximately.
c Backwater from ice.
d Maximum gage height, 5.29 ft, May 18.
e Computed on basis of correlation with nearby stations.
f Maximum gage height, 6.33 ft, Mar. 17, 1980, backwater from ice.
g Maximum gage height, 5.62 ft, Mar. 17, 1980, backwater from ice.
h Maximum gage height, 7.37 ft, Mar. 17, 1980, backwater from ice.
i Maximum gage height, 5.62 ft, Mar. 18, 1980, backwater from ice.
j Maximum gage height, 3.68 ft, Mar. 18, 1980, backwater from ice.
k Maximum gage height, 7.28 ft, Mar. 17, 1980, backwater from ice.
m Maximum gage height, 4.49 ft, Mar. 17, 1980, backwater from ice.
n Maximum gage height, 4.63 ft, Mar. 17, 1980, backwater from ice.
p Maximum gage height, 3.90 ft, Mar. 17, 1980, backwater from ice.
q Maximum gage height, 7.00 ft, Mar. 18, 1980, backwater from ice.
r Maximum gage height, 7.95 ft, Mar. 17, 1980, backwater from ice.

Measurements of streamflow at points other than gaging stations or partial-record stations are given in the following table. Those that are measurements of base flow are designated by an asterisk(*).

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Superior				
Plymouth Mine Pond Outlet	Alward Creek	Lat 46°28'14", long 89°58'56", in SE¼ NW¼ sec. 18, T.47 N., R.45 W., Gogebic County, at culvert on Plymouth Road, at Ramsay, MI.	--	1974-79	01-31-80 07-29-80	*1.13 *.95
Deer Lake Outlet	Little Gratiot River	Lat 47°21'49", long 88°02'26", in NE¼ SW¼, sec. 6, T.57 N., R.29 W., Keweenaw County, 700 ft downstream from the outlet, 700 ft-upstream from mouth and 1.8 miles southwest of Lac LaBelle, MI.	--	1979	07-24-80	*1.46
		Streams tributary to Lake Michigan				
Bichler Creek	Escanaba River	Lat 45°48'29", long 87°06'01", in NE¼ sec. 2, T.39 N., R.23 W., Delta County, at culvert on County Road 426, 2.8 miles north of Escanaba, MI.	a9	1975-76	08-18-80	*.71
Dober Mine Pond Outlet	Iron River	Lat 46°02'08", long 88°38'08", in NW¼ NW¼ sec. 1, T.42 N., R.35 W., Iron County, at mouth, at Stambaugh, MI.	--	1973-76, 1978	11-01-79 05-29-80	*.44 *.10
Skunk Creek	East Branch Sturgeon River	Lat 46°01'51", long 87°49'46", in SE¼ SE¼ sec. 17, T.42 N., R.28 W., Dickinson County, 0.3 mile upstream from mouth, 2.2 miles north of Felch, MI.	14.5	1973-76 1978-79	09-24-80	31.2
Spring Valley Drain	St. Joseph River	Lat 41°52'14", long 86°17'33", in NE¼ NW¼ sec. 16, T.7 S., R.17 W., Berrien County, at Walton Road, 3.0 miles northwest of Niles, MI.	--	1979	10-17-79	2.58
Indian Lake Outlet	Dowagiac River	Lat 41°59'31", long 86°12'17", in SW¼ NW¼ sec. 32, T.5 S., R.16 W., Cass County, at Indian Lake Road, 3.8 miles west of Dowagiac, MI.	--	--	10-11-79	0
do	do	Lat 41°59'32", long 86°11'41", in SW¼ NE¼ sec. 32, T.5 S., R.16 W., Cass County, at Sink Road, 3.4 miles west of Dowagiac, MI.	--	--	10-11-79	.31
Red Cedar River	Grand River	Lat 42°39'40", long 84°04'50", in SW¼ SE¼ sec. 10, T.3 N., R.3 E., Livingston County, at Grand River Road, in Fowlerville, MI.	--	1979	04-08-80	b149
do	do	Lat 42°41'12", long 84°08'12", in SE¼ sec. 31, T.4 N., R.3 E., Livingston County at Stow Road, 3.0 miles northwest of Fowlerville, MI.	--	1979	04-08-80	b222
Unnamed tributary	Thornapple River	Lat 42°37'58", long 84°45'12", in SE¼ NW¼ sec. 23, T.3 N., R.4 W., Eaton County, 200 feet above Potterville WWTP discharge, 1.5 miles northwest of Potterville, MI.	--	--	04-16-80	b1.43
do	do	Lat 42°38'24", long 84°46'12", in NE¼ NW¼ sec. 22, T.3 N., R.4 W., Eaton County at Gresham Highway, 1.5 miles northwest of Potterville, MI.	--	--	04-16-80	b3.05
Plaster Creek	Grand River	Lat 42°56'35", long 85°41'55", in NE¼ NW¼ sec. 35, T.7 N., R.12 W., Kent County, at Freeman Road, in Grand Rapids, MI.	--	--	09-16-80	b19.5
Platte River	Platte Lake	Lat 44°40'57", long 85°55'20", in NE¼ SE¼ sec. 6, T.26 N., R.13 W., Benzie County, at County Road 669, 4.7 miles northeast of Honor, MI.	--	--	06-02-80	b60.7
do	do	Lat 44°40'29", long 85°55'48", in SE¼ SW¼ sec. 6, T.26 N., R.13 W., Benzie County, at Fewins Road, 4.1 miles northeast of Honor, MI.	--	--	07-01-80 08-04-80 09-02-80	b67.3 *b51.9 *b51.2
Brundage Creek	Platte River	Lat 44°39'48", long 85°55'27", in SW¼ SE¼ sec. 7, T.26 N., R.13 W., Benzie County, at U.S. Highway 31, 700 ft downstream from Stanley Creek, 0.5 mile upstream from mouth, and 4.7 miles east of Honor, MI.	12.5	1957 1966-69	06-02-80 06-30-80 08-04-80 09-02-80	b13.1 b13.0 *b11.2 *b12.1

See footnotes at end of table.

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Michigan--Continued				
Platte River	Platte Lake	Lat 44°39'36", long 85°56'36", in SW¼ SE¼ sec. 12, T.26 N., R.14 W., Benzie County, at U.S. Highway 31, 4.0 miles east of Honor, MI.	91.9	1957 1959-69	06-02-80	b79.5
					06-30-80	b85.7
					08-04-80	*b66.5
					09-02-80	*b74.2
Carter Creek	Platte River	Lat 44°38'30", long 85°59'28", in NE¼ NE¼ sec. 22, T.26 N., R.14 W., Benzie County, at Brownell Road, 0.5 mile upstream from mouth and 2.5 miles southeast of Honor, MI.	10.9	1958	06-02-80	b8.4
					06-30-80	b8.3
					08-04-80	*b6.1
					09-02-80	*b8.0
Platte River	Platte Lake	Lat 44°38'51", long 85°59'26", in SE¼ SW¼ sec. 15, T.26 N., R.14 W., Benzie County, at Case Bridge on Pioneer Road, 0.5 mile downstream from Carter Creek, and 2.0 miles southeast of Honor, MI	109	1958, 1971	06-02-80	b122
					06-30-80	b116
					08-04-80	*b85.0
					09-02-80	*b93.2
Collison Creek	Platte River	Lat 44°39'45", long 86°00'10", in SW¼ SE¼ sec. 9, T.26 N., R.14 W., Benzie County, at U.S. Highway 31, 0.2 mile upstream from mouth at Honor, MI.	4.75	1958	06-02-80	b.67
					06-30-80	b.64
					08-04-80	*b.44
					09-02-80	*b.40
Platte River	Platte Lake	Lat 44°40'17", long 86°02'12", in NW¼ NW¼ sec. 8, T.26 N., R.14 W., Benzie County, at Indian Hill Road, 1.0 mile northwest of Honor, MI	--	--	06-02-80	b121
					06-30-80	b122
					08-04-80	*b99.0
					09-02-80	*b144
North Branch Platte River	Platte River	Lat 44°41'01", long 86°03'30", in SE¼ NE¼ sec. 1, T.27 N., R.15 W., Benzie County, at Deadstream Road, 2.5 miles northwest of Honor, MI.	31.1	1958	06-02-80	b15.2
					06-30-80	b9.7
					08-04-80	*b14.1
					09-02-80	*b15.0
Unnamed tributary	Platte Lake	Lat 44°40'05", long 86°02'50", in SE¼ NW¼ sec. 7, T.26 N., R.14 W., Benzie County, at South Lake Road, 2.0 miles west of Honor, MI.	--	--	06-02-80	b.86
					06-30-80	b.91
					08-04-80	*b.74
					09-02-80	*b.57
do	do	Lat 44°40'10", long 86°03'57", in SW¼ SE¼ sec. 12, T.26 N., R.15 W., Benzie County, at South Lake Road, 2.5 miles west of Honor, MI.	--	--	06-02-80	b1.3
					06-30-80	b1.3
					08-04-80	*b1.0
					09-02-80	*b1.0
do	do	Lat 44°41'16", long 86°07'11", in SE¼ NE¼ sec. 4, T.26 N., R.15 W., Benzie County, at South Lake Road, 6.5 miles northwest of Honor, MI.	--	--	06-02-80	b.63
					06-30-80	b.60
					08-04-80	*b.40
					09-02-80	*b.30
Otter Creek	Lake Michigan	Lat 44°44'32", long 86°03'41", in SE¼ NE¼ sec. 13, T.27 N., R.15 W., Benzie County, at outlet of Otter Lake, 1.8 miles upstream from mouth, and 4.8 miles south of Empire, MI.	1.2	1979	10-29-79	*4.68
					05-13-80	*6.14
					08-28-80	*3.09
Elk River	do	Lat 44°54'02", long 85°24'42", in SW¼ NW¼ sec. 21, T.29 N., R.9 W., Antrim County, on upstream side of highway bridge at nonoperative hydroelectric plant in Elk Rapids, 500 ft upstream from mouth.	513	c1973-77	07-31-80	*544
		Streams tributary to Lake Huron				
Coppler Creek	Pine River	Lat 44°29'26", long 83°26'16", in SE¼ NW¼ sec. 11, T.24 N., R.8 E., Iosco County, 2.4 miles upstream from mouth and 6.8 miles northwest of Oscoda, MI.	--	--	12-21-79	*5.97
					01-30-80	*5.10
do	do	Lat 44°29'48", long 83°24'46", in SE¼ SW¼ sec. 1, T.24 N., R.8 E., Iosco County, at bridge on State Highway 171, 1.0 mile upstream from mouth and 6.4 miles northwest of Oscoda, MI.	--	--	01-30-80	*4.07
Dry Creek	Van Etten Lake	Lat 44°28'39", long 83°23'39", in SE¼ NW¼ sec. 18, T.24 N., R.9 E., Iosco County, at bridge on State Highway 171, 0.6 mile upstream from mouth and 4.8 miles northwest of Oscoda, MI.	--	--	01-30-80	*.30
					03-04-80	0
					06-12-80	*2.17
					07-17-80	*.04

See footnotes at end of table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued				
Dry Creek	Van Etten Lake	Lat 44°28'40", long 83°23'06", in NW¼ NE¼ sec. 18, T.24 N., R.9 E., Iosco County, 0.2 mile upstream from mouth and 4.7 miles northwest of Oscoda, MI.	--	--	12-21-79 01-11-80 01-30-80 03-04-80 06-12-80 07-17-80	*1.02 1.42 *.54 *.25 *2.45 *.39
Shiawassee River	Saginaw River	Lat 42°47'32", long 83°38'07", in SW¼ NE¼ sec. 33, T.5 N., R.7 E., Oakland County, near railroad tracks, in Holly, MI.	--	--	08-12-80 09-10-80	b26.5 b27.5
do	do	Lat 42°47'57", long 83°38'52", in SW¼ sec. 28, T.5 N., R.7 E., Oakland County, at Fish Lake Road, 0.5 mile west of Holly, MI.	49.2	1955, 1963, 1966-68	08-12-80 09-10-80	b26.2 b22.1
do	do	Lat 42°47'42", long 83°42'20", in NW¼ NW¼ sec. 36, T.5 N., R.6 E., Genesee County, below dam at Fenton, MI.	--	--	08-12-80 09-10-80	b23.8 b20.6
do	do	Lat 42°48'54", long 83°43'32", in SW¼ SW¼ sec. 23, T.5 N., R.6 E., Genesee County, at Torrey Road, 0.2 mile northwest of Fenton, MI	--	1963, 1966	08-12-80 09-10-80	b32.3 b24.3
do	do	Lat 42°48'57", long 83°46'56", in NE¼ SW¼ sec. 20, T.5 N., R.6 E., Genesee County, 150 feet below dam at Linden, MI.	--	--	08-12-80 09-10-80	b34.7 b21.3
Brady Creek	Bad River	Lat 43°17'15", long 84°35'15", in NW¼ NE¼ sec. 6, T.10 N., R.2 W., Gratiot County, above WWTP lagoon outfall at Ithaca, MI.	--	--	04-23-80	b.05
do	do	Lat 43°17'15", long 84°35'13", in NE¼ NE¼ sec. 6, T.10 N., R.2 W., Gratiot County below WWTP lagoon outfall at Ithaca, MI.	--	--	04-23-80	b5.18
do	do	Lat 43°16'37", long 84°33'47", in SW¼ SW¼ sec. 4, T.10 N., R.2 W., Gratiot County, on Bagley Road, 1.0 mile east of Ithaca, MI.	--	--	04-23-80	b6.97
do	do	Lat 43°16'43", long 84°31'25", in SW¼ SW¼ sec. 2, T.10 N., R.2 W., Gratiot County, on Crapo Road, 3.0 miles east of Ithaca, MI	--	--	04-23-80	b7.93
Bad River	Shiawassee River	Lat 43°17'48", long 84°13'45", in NW¼ sec. 3, T.10 N., R.2 E., Saginaw County, at Hemlock Road, 2.5 miles north of Brant, MI.	a89	1949-59d	08-13-80	15.7
do	do	Lat 43°18'08", long 84°08'38", in NW¼ sec. 5, T.10 N., R.3 E., Saginaw County, at State Highway 52, in St. Charles, MI.	--	--	06-10-80 08-13-80	529 18.8
South Fork Bad River	Bad River	Lat 43°15'33", long 84°12'32", in NE¼ sec. 22, T.10 N., R.2 E., Saginaw County, at Brant Road, 1.0 mile east of Brant, MI.	--	--	06-11-80 08-14-80	26.4 22.3
Potato Creek	South Fork Bad River	Lat 43°15'42", long 84°12'33", in SE¼ sec. 15, T.10 N., R.2 E., Saginaw County, at Raucholz Road, 1.0 mile east of Brant, MI.	--	--	06-11-80 08-14-80	36.8 17.0
South Fork Bad River	Bad River	Lat 43°17'54", long 84°08'32", in SW¼ sec. 5, T.10 N., R.3 E., Saginaw County, at State Highway 52, in St. Charles, MI.	--	1963	06-10-80 08-13-80	139 77.1
Beaver Creek	do	Lat 43°20'13", long 84°13'44", in SW¼ sec. 22, T.11 N., R.2 E., Saginaw County, at Hemlock Road, 0.2 mile north of Nelson, MI.	--	--	06-11-80 08-14-80	108 4.44
do	do	Lat 43°18'38", long 84°08'32", SW¼ sec. 32, T.11 N., R.3 E., Saginaw County, at State Highway 52, 0.5 mile north of St. Charles, MI.	--	--	06-10-80 08-13-80	299 e2.6
Pickerel Creek	do	Lat 43°16'08", long 84°07'44", in NW¼ sec. 16, T.10 N., R.3 E., Saginaw County, at McKeighan Road, 1.0 mile north of Fergus, MI.	--	--	06-09-80 08-14-80	5.49 *3.26

See footnotes at end of table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Huron--Continued				
Wolf Creek	Bad River	Lat 43°20'11", long 84°11'22", in SW¼ sec. 24, T.11 N., R.2 E., Saginaw County, at Fordney Road, 2.0 miles east of Nelson, MI.	--	--	06-10-80 08-12-80	4.94 e1.3
Shiawassee River	Saginaw River	Lat 43°20'17", long 84°04'20", in SE¼ sec. 23, T.11 N., R.3 E., Saginaw County, at extension of Miller Road, 3.0 miles southeast of Swan Creek, MI.	--	--	08-12-80	269
Bear Creek	Shiawassee River	Lat 43°15'19", long 84°05'18", in NW¼ sec. 2, T.10 N., R.3 E., Saginaw County, at Fergus Road, 2.1 miles east of Fergus, MI.	--	--	06-09-80	11.4
Swan Creek	Shiawassee River	Lat 43°24'03", long 84°05'57", in SE¼ sec. 34, T.12 N., R.3 E., Saginaw County, at Schomaker Road, 3.9 miles northeast of Garfield, MI.	--	--	06-11-80 08-12-80	81.1 24.0
Marsh Creek	Swan Creek	Lat 43°21'56", long 84°10'22", in SE¼ sec. 12, T.11 N., R.2 E., Saginaw County, at Roosevelt Road, 2.2 miles northwest of Garfield, MI.	--	--	06-11-80 08-12-80	*9.26 *3.98
Swan Creek	Shiawassee River	Lat 43°21'18", long 84°04'20", in SW¼ sec. 13, T.11 N., R.3 E., Saginaw County, at Miller Road, 3.1 miles east of Garfield, MI.	--	--	06-12-80 08-12-80	154 78.0
Henry Drain	Flint River	Lat 43°07'40", long 83°24'37", in NE¼ NE¼ sec. 9, T.8 N., R.9 E., Lapeer County, at Mt. Morris Road, 1.6 miles south of Columbiaville, MI.	--	1977	10-11-79	.70
Hasler Creek	do	Lat 43°05'37", long 83°27'34", in SE¼ sec. 13, T.8 N., R.8 E., Genesee County, at Coldwater Road, 2.0 miles east of Richfield, MI.	--	1977	10-11-79	2.06
Flint River	Shiawassee River	Lat 43°04'35", long 83°39'17", in SW¼ SW¼ sec. 21, T.8 N., R.7 E., Genesee County at Carpenter Road, at Flint, MI.	--	1974	10-11-79	320
Kearsley Creek	Flint River	Lat 43°03'22", long 83°39'25", in SE¼ NE¼ sec. 32, T.8 N., R.7 E., Genesee County, at Western Road, at Flint, MI.	--	1977	10-11-79	12.3
Duff Creek	Cass River	Lat 43°19'43", long 83°04'00", in SE¼ SE¼ sec. 32, T.11 N., R.12 E., Sanilac County, above waste water treatment plant in Marlette, MI.	--	--	08-13-80	*b.47
do	do	Lat 43°19'47", long 83°03'52", in SE¼ SE¼ sec. 32, T.11 N., R.12 E., Sanilac County, at Boyne Road, 0.2 mile east of Marlette, MI.	--	--	08-13-80	*b1.21
do	do	Lat 43°20'47", long 83°02'42", in SW¼ SW¼ sec. 27, T.11 N., R.12 E., Sanilac County, at Decker Road, 1.5 miles northeast of Marlette, MI.	--	--	08-13-80	*b1.50
do	do	Lat 43°21'29", long 83°01'37", in NE¼ NE¼ sec. 27, T.11 N., R.12 E., Sanilac County, at Frenchline Road, 2.9 miles northeast of Marlette, MI.	--	--	08-13-80	*b2.00
do	do	Lat 43°22'00", long 83°00'20", in NE¼ SE¼ sec. 23, T.11 N., R.12 E., Sanilac County, at Germania Road, 4.5 miles northeast of Marlette, MI.	14.3	1970	08-13-80	*b1.83
		Streams tributary to Lake St. Clair				
Clinton River	Lake St. Clair	Lat 42°44'37", long 83°25'31", in NW¼ sec. 20, T.4 N., R.9 W., Oakland County, at Bluegrass Road, in Clarkston, MI.	--	1979	12-13-79 04-21-80 07-10-80	*6.47 14.8 *5.10

See footnotes at end of table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake St. Clair--Continued				
Parke Lake Inlet	Parke Lake	Lat 42°44'12", long 83°25'11", in SW¼ sec. 20, T.4 N., R.9 E., Oakland County, at State Highway 15, in Clarkston, MI.	--	1979	12-13-79 04-21-80 07-10-80	*4.71 7.32 *4.72
Clinton River	Lake St. Clair	Lat 42°44'02", long 83°25'14", in SW¼ sec. 20, T.4 N., R.9 E., Oakland County, at Depot Road, in Clarkston, MI.	--	1979	12-13-79 04-21-80 07-10-80	*3.25 8.52 *1.14
Parke Lake Outlet	Clinton River	Lat 42°44'12", long 83°24'51", in SE¼ sec. 20, T.4 N., R.9 E., Oakland County, 0.1 mile south of Parke Lake, in Clarkston, MI.	--	1979	12-13-79 04-21-80 07-10-80	*6.26 7.26 *5.76
Clinton River	Lake St. Clair	Lat 42°38'32", long 83°15'37", in SE¼ NE¼ sec. 27, T.3 N., R.10 E., Oakland County at State Highway 59, in Pontiac, MI.	--	--	09-04-80	b79.8
Unnamed tributary	Clinton River	Lat 42°38'11", long 83°14'58", in SE¼ NE¼ sec. 34, T.3 N., R.10 E., Oakland County at Opdyke Road, at Pontiac, MI.	--	--	09-04-80	b1.5
Galloway Creek	do	Lat 42°39'34", long 83°12'04", in SE¼ NW¼ sec. 19, T.3 N., R.11 E., Oakland County, on Butler Road, 2.5 miles east of Pontiac, MI.	--	--	09-04-80	b7.0
Clinton River	Lake St. Clair	Lat 42°39'02", long 83°10'41", in NW¼ NE¼ sec. 29, T.3 N., R.11 E., Oakland County, on Hamlin Road, 3.7 miles east of Pontiac, MI.	--	--	09-04-80	b115
North Branch Clinton River	Clinton River	Lat 42°54'59", long 83°02'42", in NE¼ sec. 28, T.6 N., R.12 E., Lapeer County, on State Highway 53 at Almont, MI.	9.56	1959-62cf 1963-68d 1969-80f	09-22-80 09-29-80	*b2.3 *b2.0
Unnamed tributary	North Branch Clinton River	Lat 42°54'27", long 83°00'17", in SE¼ sec. 26, T.6 N., R.12 E., Lapeer County, on Hough Road, 1.5 miles southeast of Almont, MI.	--	--	09-22-80 09-29-80	*b0.70 *b0.33
Unnamed tributary	do	Lat 42°53'29', long 83°01'06", in NW¼ sec. 2, T.5 N., R.12 E., Macomb County, on Kidder Road, 1.8 miles south of Almont, MI.	--	--	09-22-80 09-29-80	*b0.39 *b0.45
North Branch Clinton River	Clinton River	Lat 42°52'42", long 83°00'02", in SW¼ SW¼ sec. 1, T.5 N., R.12 E., Macomb County on McKay Road, 3.5 miles southeast of Almont, MI.	--	--	09-22-80 09-29-80	*b4.3 *b3.2
		Streams tributary to Detroit River				
River Rouge	Detroit River	Lat 42°25'26", long 83°16'09", in SE¼ sec. 4, T.1 S., R.10 E., Wayne County, at Seven Mile Road, in Detroit, MI.	101	1979	10-22-79 11-09-79	*16.8 21.5
Upper River Rouge	River Rouge	Lat 42°23'04", long 83°16'35", in SE¼ NE¼ sec. 20, T.1 S., R.10 E., Wayne County, at Telegraph Road, in Detroit, MI	a67.3	1979	10-22-79 11-09-79	*5.58 13.8
Middle River Rouge	do	Lat 42°20'16", long 83°15'32", in NE¼ sec. 9, T.2 S., R.10 E., Wayne County, at Outer Drive, in Dearborn Heights, MI.	106	1979	10-22-79 11-09-79	*19.1 41.4
Lower River Rouge	do	Lat 42°18'31", long 83°15'10", in NE¼ sec. 22, T.2 S., R.10 E., Wayne County, at Military Road, in Dearborn, MI.	a91	1979	10-22-79 11-09-79	*4.14 20.6
River Rouge	Detroit River	Lat 42°18'39", long 83°13'36", in Land Grant 663, T.2 S., R.10 E., Wayne County, at Evergreen Road, in Dearborn, MI.	a400	1979	10-02-79 10-22-79 11-09-79 11-21-79	149 *71.4 123 *90.8
		Streams tributary to Lake Erie				
Norton Creek	Huron River	Lat 42°30'41", long 83°33'04", in NE¼ SW¼ sec. 6, T.1 N., R.8 E., Oakland County, 0.8 mile upstream of Pontiac Trail Road, and 1.0 mile southwest of Wixom, MI.	--	--	09-10-80	*b1.9

See footnotes at end of table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi^2)	Measured previously (water years)	Measurements	
					Date	Discharge (ft^3/s)
		Streams tributary to Lake Erie--Continued				
Congdon Drain	Norton Creek	Lat 42°30'40", long 83°33'00", in NE¼ SW¼ sec. 6, T.1 N., R.8 E., Oakland County, 0.8 mile upstream of Pontiac Trail Road, and 1.0 mile southwest of Wixom, MI.	--	--	09-10-80	*b1.0
Norton Creek	Huron River	Lat 42°31'26", long 83°32'32", in NE¼ SW¼ sec. 31, T.2 N., R.8 E., Oakland County, at West Maple Road, 0.5 mile northwest of Wixom, MI.	--	--	09-10-80	*b3.9
do	do	Lat 42°32'36", long 83°33'02", in NE¼ SW¼ sec. 30, T.2 N., R.8 E., Oakland County, south of Charms Road, below the Wixom Waste Water Treatment Plant, 1.5 miles northwest of Wixom, MI.	--	1977-78	09-10-80	*b6.8
Davis Creek	do	Lat 42°27'57", long 83°42'26", in SE¼ NE¼ sec. 22, T.1 N., R.6 E., Livingston County, at Doane Road, 2.3 miles west of South Lyon, MI.	--	--	11-05-79	*b3.5
					12-03-79	b8.16
					01-09-80	b8.93
					02-06-80	*b3.54
					03-06-80	*b4.85
					04-02-80	b33.5
					05-07-80	b19.4
					06-10-80	b27.6
					07-08-80	*b8.4
					08-07-80	*b7.0
					09-08-80	*b6.0
Walker Drain	Inchwagh Lake	Lat 42°25'52", long 83°40'17", in SW¼ SE¼ sec. 36, T.1 N., R.6 E., Livingston County, at Eight Mile Road, 1.2 miles southwest of South Lyon, MI.	--	--	11-05-79	*b.43
					12-03-79	b.80
					01-09-80	b1.23
					02-06-80	*b1.22
					03-06-80	*b.56
					04-02-80	b7.6
					05-07-80	b4.18
					06-10-80	b6.3
					07-08-80	*b1.1
					08-07-80	*b0.9
					09-08-80	b3.6
Unnamed tributary	Inchwagh Lake	Lat 42°26'43", long 83"39'58", in NW¼ NW¼ sec. 31, T.1 N., R.7 E., Oakland County, at Nine Mile Road, 0.3 mile west of South Lyon, MI.	--	--	11-05-79	*b.23
					12-03-79	b.87
					01-09-80	b.94
					02-06-80	*b.33
					03-08-80	*b.50
					04-03-80	b4.3
					05-07-80	b2.21
					06-10-80	b1.5
					07-08-80	*b1.1
					08-07-80	*b1.5
					09-08-80	b0.9
Unnamed tributary	do	Lat 42°27'21", long 83°39'04", in NE¼ sec. 30, T.1 N., R.7 E., Oakland County, at Pontiac Trail Road, at South Lyon, MI	--	--	12-03-79	b.03
					01-09-80	b.25
					02-06-80	*b0
					04-02-80	b4.88
					05-07-80	b1.71
					06-10-80	b4.1
					07-08-80	b.13
					08-07-80	*b.12
					09-08-80	*b.08
do	do	Lat 42°27'21", long 83°39'38", in NW¼ NW¼ sec. 30, T.1 N., R.7 E., Oakland County, below WWTP, at South Lyon, MI.	--	--	11-05-79	b3.6
					12-03-79	b1.97
					01-09-80	b3.45
					02-06-80	b3.70
					03-06-80	*b3.52
					04-02-80	b8.86
					05-06-80	b5.81
					06-10-80	b8.8
					07-08-80	*b3.0
					08-07-80	*b1.4
					09-08-80	b5.0

See footnotes at end of table

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Erie--Continued				
Inchwagh Lake Outlet	Davis Creek	Lat 42°27'09", long 83°41'46", in NE¼ sec. 26, T.1 N., R.6 E., Livingston County, at Rushton Road, 1.8 miles west of South Lyon, MI.	18.9	1970-71	11-05-79 12-03-79 01-09-80 02-06-80 03-06-80 03-06-80 04-02-80 05-07-80 06-10-80 07-08-80 08-07-80 09-08-80	*b4.0 b6.04 b7.53 *b3.34 *b5.34 b13.5 b31.0 b12.7 b26.3 *b4.0 *b7.3 b17.4
Tobin Lake Outlet	do	Lat 42°26'37", long 83°42'33", in NE¼ sec. 34, T.1 N., R.6 E., Livingston County, at Nine Mile Road, 1.6 miles east of Whitmore Lake, MI.	--	--	11-05-79 12-03-79 01-09-80 02-06-80 03-06-80 04-03-80 05-07-80 06-10-80 07-08-80 08-07-80 09-08-80	*b.85 b3.04 b6.83 *b.67 *b4.3 b25.3 b8.31 b20.1 *b1.4 *b5.47 b12.6
Monahan Lake Outlet	Davis Creek	Lat 42°26'57", long 83°43'57", in NW¼ SE¼ sec. 28, T.1 N., R.6 E., Livingston County, on Tuthill Road, 0.9 mile northeast of Whitmore Lake, MI.	--	--	04-02-80 05-07-80 06-10-80 07-08-80 08-07-80 09-08-80	b4.95 b1.68 b2.60 *b.42 *b.56 b.40
Davis Creek	Huron River	Lat 42°27'23", long 83°44'24", in NW¼ sec. 28, T.1 N., R.6 E., Livingston County, at bridge on Fairlane Road (formerly Spicer Road), 1.8 miles west of South Lyon, MI.	--	1977, 78	11-05-79 04-03-80 05-07-80 06-10-80	*b11.4 b114 b53.1 b79.9
Chilson Creek	Huron River	Lat 42°29'52", long 83°51'33", in NW¼ NE¼ sec. 9, T.1 N., R.5 E., Livingston County, at Chilson Road, 1.4 miles north of Pettysville, MI.	--	1973	07-23-80	*b3.46
do	do	Lat 42°29'10", long 83°51'40", in SE¼ SW¼ sec. 9, T.1 N., R.5 E., Livingston County, at railroad bridge, 0.6 mile north of Pettysville, MI.	--	1973	07-23-80	*b2.98
do	do	Lat 42°28'39", long 83°51'57", in SW¼ NW¼ sec. 16, T.1 N., R.5 E., Livingston County, at Kimble Road, in Pettysville, MI.	--	--	07-23-80	*b2.16
Saline River	Raisin River	Lat 42°10'15", long 83°49'32", in NE¼ SW¼ sec. 34, T.3 S., R.5 E., Washtenaw County, at Dell Road, 1.5 miles west of Saline, MI.	44.3	1964	08-12-80	*b16.2
Saline River tributary	Saline River	Lat 42°10'34", long 83°49'17", in SE¼ sec. 34, T.3 S., R.5 E., Washtenaw County, at Waterworks Road, 2.2 miles northwest of Saline, MI.	13.2	1944, 1964 1970-72	08-12-80	*b1.5
Saline River	Raisin River	Lat 42°09'35", long 83°47'01", in SE¼ sec. 1, T.4 S., R.5 E., Washtenaw County, at Macon Road, in Saline, MI.	77.6	1965-72	08-12-80	*b22.4
Pittsfield Drain	Saline River	Lat 42°09'33", long 83°45'30", in SE¼ sec. 6, T.4 S., R.6 E., Washtenaw County, at Willis Road, in Saline, MI.	5.12	1964	08-12-80	*b.30
Koch-Warner Drain	do	Lat 42°09'20", long 83°46'30", in SW¼ SW¼ sec. 6, T.4 S., R.6 E., Washtenaw County, at Saline Milan Road, at Saline, MI.	12.1	1970-72	08-12-80	*b8.1
Saline River	Raisin River	Lat 42°07'50", long 83°46'35", in SW¼ sec. 18, T.4 S., R.5 E., Washtenaw County, at Maple Road, 2.8 miles south of Saline, MI.	94.6	1966-77d 1978-80f	08-12-80	*b35.8

DISCHARGE MEASUREMENTS MADE AT MISCELLANEOUS SITES DURING WATER YEAR 1980--CONTINUED

Stream	Tributary to	Location	Drainage area (mi²)	Measured previously (water years)	Measurements	
					Date	Discharge (ft³/s)
		Streams tributary to Lake Erie--Continued				
Bean Creek	Tiffin River	Lat 41°51'17", long 84°21'05", in NE¼ NW¼ sec. 19, T.7 S., R.1 E., Lenawee County, at Jackson Street, in Hudson, MI.	--	1967, 79	10-02-79	[*][b]7.9
do	do	Lat 41°50'27", long 84°20'55", in SE¼ SW¼ sec. 19, T.7 S., R.1 E., Lenawee County, at Nelson Road, 1.0 mile south of Hudson, MI.	--	1967, 79	10-02-79	[*][b]10.0

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[*] Base flow.
[a] Approximately.
[b] Discharge measurement made by employees of Michigan Department of Natural Resources.
[c] Operated as a low-flow partial-record station.
[d] Operated as a continuous-record gaging station.
[e] Field estimate.
[f] Operated as a crest-stage partial-record station.

MARQUETTE IRON RANGE LOW-FLOW INVESTIGATIONS

MARQUETTE COUNTY, MI

Two series of base-flow discharge measurements were made at selected locations on the western tributaries of the Chocolay River Basin as part of a water resources investigation carried on in cooperation with the Michigan Department of Natural Resources. The first series was made on Oct. 17, 1979 and the second series was made on July 15, 1980. These measurements, along with streamflow records, ground-water records, water-quality records, and geologic studies serve to provide base line data to evaluate hydrologic conditions prior to development of the area. The measurements are believed to be unaffected by surface runoff due to antecedent precipitation, and thus represent base flow.

The measurements on each stream are listed in order proceeding downstream, and each tributary is inserted in the order in which it enters the main stream. Drainage areas shown were determined from the U.S. Geological Survey topographic maps having scales of 1:24,000 or 1:62,500 and a contour interval of 10 or 20 feet.

See "Surface Water Records of Michigan, 1963" (p.218), "____ 1964" (p.220), "____ 1979" (p.470) for listing of previous measurements.

Stream	Location	Drainage area (mi²)	Measured discharge (ft³/s)	Cfs per square mile	Measured discharge (ft³/s)	Cfs per square mile
			Oct. 17, 1979		July 15, 1980	
Big Creek	Lat 46°24'07", long 87°20'47", in NE¼ sec.7, T.46 N., R.24 W., Marquette County, 0.4 mile upstream from mouth of Peterson Creek, 3 miles southeast of Sands, and 4.3 miles northeast of Sands Station.	4.60	9.83	2.14	10.3	2.24
Peterson Creek	Lat 46°24'59", long 87°24'22", in NW¼ NW¼ sec.2, T.46 N., R.25 W., Marquette County, at old County Road 553, 0.3 mile south of Sands.	2.93	0	0	0	0
do	Lat 46°24'44", long 87°21'53", in SW¼ NW¼ sec.6, T.46 N., R.24 W., Marquette County, at point where trail road nears stream, 2.0 miles east of Sands and 3.9 miles northeast of Sands Station.	5.38	2.06	.38	2.05	.38
Norby Creek	Lat 46°24'07", long 87°21'38", in NE¼ NW¼ sec.7, T.46 N., R.24 W., Marquette County, at logging bridge 1,900 ft upstream from old trail crossing, 2.5 miles southeast of Sands.	1.41	.17	.12	.14	.10
Peterson Creek[a]	Lat 46°24'21", long 87°20'38", in SW¼ SW¼ sec.5, T.46 N., R.24 W., Marquette County, 150 ft downstream from old bridge crossing, about 500 ft upstream from mouth and 3.2 miles east of Sands.	7.24	2.54	.35	2.68	.37
Big Creek[a]	Lat 46°24'43", long 87°19'57", in NW¼ SE¼ sec.5, T.46 N., R.24 W., Marquette County, at abandoned road crossing, 0.7 mile downstream from mouth of Peterson Creek and 3.6 miles east of Sands.	14.4	14.96	1.04	16.20	1.12
do	Lat 46°25'38", long 87°20'06", in SW¼ NE¼ sec.32, T.47 N., R.24 W., Marquette County, at twin culverts on Karen Road, 3.5 miles east of Sands and 2.6 miles southwest of Green Garden.	15.8	21.19	1.34	21.29	1.35
do	Gaging station near Harvey (04044563).	17.0	30.45	1.79	27.52	1.62
do[a]	Lat 46°27'55", long 87°19'07", in SE¼ SW¼ sec.16, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 1 mile upstream from mouth, 2.5 miles southeast of Harvey and 0.2 mile northwest of Beaver Grove.	24.0	40.67	1.69	38.01	1.58
Cedar Creek[a]	Lat 46°26'11", long 87°24'20", in SW¼ SW¼ sec.26, T.47 N., R.25 W., Marquette County, at headwaters, 0.3 mile east of old County Road 553 and 1.2 miles north of Sands.	5.44	.30	.06	.21	.04
do	Lat 46°27'08", long 87°22'46", in NE¼ SW¼ sec.24, T.47 N., R.25 W., Marquette County, about 1 mile upstream from gaging station (04044573), 2.5 miles northeast of Sands and 4.4 miles northeast of Gentian.	7.67	10.89	1.42	8.31	1.08
do	Gaging station near Harvey (04044573).	9.04	12.74	1.41	13.36	1.48

See footnotes at end of the table

MARQUETTE IRON RANGE LOW-FLOW INVESTIGATIONS

MARQUETTE COUNTY, MI--Continued

Stream	Location	Drainage area (mi²)	Measured discharge (ft³/s)	Cfs per square mile	Measured discharge (ft³/s)	Cfs per square mile
			Oct. 17, 1979		July 15, 1980	
Cedar Creek[a]	Lat 46°28'23", long 87°19'46", in SE¼ NE¼ sec.17, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.7 mile upstream from mouth, 1.8 miles southeast of Harvey and 0.9 mile northwest of Beaver Grove.	10.6	19.46	1.84	17.82	1.68
Cherry Creek	Lat 46°27'43", long 87°24'20", in NW¼ NW¼ sec.23, T.47 N., R.25 W., Marquette County, at headwaters, 3.3 miles southwest of Harvey and 4.0 miles northeast of Cascade.	.14	.02	.14	.02	.14
do[a]	Lat 46°27'47", long 87°23'31", in NW¼ NE¼ sec.23, T.47 N., R.25 W., Marquette County, about 600 ft north of County Road 480, at point where creek bends north, 2.8 miles southwest of Harvey and 3.1 miles northeast of Sands.	.33	5.44	16.5	5.26	15.9
do	Lat 46°28'02", long 87°22'52", in NW¼ SW¼ sec.13, T.47 N., R.25 W., Marquette County, at end of trail road, 2.2 miles southwest of Harvey and 4.9 miles northeast of Gentian.	.61	10.56	17.3	9.75	16.0
do	Gaging station near Harvey (04044583).	4.53	19.68	4.34	18.35	4.05
do[a]	Lat 46°28'45", long 87°20'18", in SE¼ SW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on U.S. Highway 41, 0.8 mile upstream from mouth, 1.2 miles southeast of Harvey and 1.5 miles northwest of Beaver Grove.	5.07	26.60	5.25	25.33	5.00
Silver Creek	Lat 46°28'22", long 87°23'48", in SE¼ NW¼ sec.14, T.47 N., R.25 W., Marquette County, at trail crossing, 2.5 miles southwest of Harvey and 4.6 miles northeast of Cascade.	4.37	3.18	.73	3.13	.72
do	Lat 46°28'12", long 87°23'06", in SW¼ NW¼ sec.13, T.47 N., R.25 W., Marquette County, at point where stream turns north, 0.7 mile upstream from small unnamed tributary entering from the left and 3.4 miles west of Beaver Grove.	4.57			2.58	.56
do[a]	Lat 46°28'48", long 87°23'07", in SW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at double culvert on Silver Creek Road, 1.7 miles southwest of Harvey and 4.3 miles northeast of Sands.	4.88	2.54	.52	2.35	.48
Unnamed Tributary to Silver Creek	Lat 46°28'56", long 87°23'01", in NW¼ SW¼ sec.12, T.47 N., R.25 W., Marquette County, at mouth and 1.5 miles southwest of Harvey.	1.09	.06	.06	.02	.02
Silver Creek	Gaging station at Harvey (04044595).	8.58	9.70	1.13	8.92	1.04
do[a]	Lat 46°29'22", long 87°20'16", in NE¼ NW¼ sec.8, T.47 N., R.24 W., Marquette County, at bridge on Lake Superior and Ishpeming Railroad, 300 ft northwest of overpass on State Highway 28 and 0.9 mile southeast of Harvey.	9.91	9.17	.93	8.51	.86

[a] At site of partial-record station

Samples are collected at sites other than gaging stations and partial-record stations to give better areal coverage in a river basin. Such sites are referred to as miscellaneous sites.

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)												
OCT , 1979												
17...	1200	9.8	164	7.9	9.0	7.0	10	1.0	11.2	94	84	7
JUL , 1980												
15...	1215	10	175	8.0	25.0	14.0	6	1.0	9.6	96	85	3
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)												
OCT , 1979												
17...	1015	2.1	160	8.0	7.0	7.0	5	1.0	11.6	98	84	11
JUL , 1980												
15...	1045	2.0	170	7.9	23.0	9.0	--	--	10.8	96	81	3
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)												
OCT , 1979												
17...	1400	.16	142	7.9	9.0	7.0	--	--	11.2	94	73	11
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)												
OCT , 1979												
18...	1045	15	172	8.0	-1.0	4.0	--	--	12.1	95	86	10
JUL , 1980												
16...	0915	16	175	7.8	19.0	12.0	--	--	9.6	91	86	4
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)												
OCT , 1979												
17...	1630	30	168	7.9	8.0	7.5	5	1.0	11.0	93	87	6
JUL , 1980												
16...	1030	27	180	7.9	23.0	11.0	2	.75	9.7	90	85	3
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)												
OCT , 1979												
18...	1110	41	162	7.7	5.0	5.5	--	--	11.6	94	88	6
JUL , 1980												
16...	1000	38	187	7.9	19.0	11.5	--	--	10.2	94	--	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)												
OCT , 1979												
17...	1515	.30	150	8.0	8.0	7.0	5	1.0	10.6	90	59	4
JUL , 1980												
15...	1445	.21	137	7.9	25.0	8.0	2	.30	10.6	93	59	5

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)												
OCT , 1979												
17...	26	4.7	1.1	4	.1	1.8	.7	94	0	77	1.9	7.5
JUL , 1980												
15...	26	4.8	1.3	3	.1	--	.6	100	0	82	1.6	5.6
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)												
OCT , 1979												
17...	26	4.5	1.1	4	.1	1.8	.7	88	0	72	1.4	8.1
JUL , 1980												
15...	25	4.6	1.3	3	.1	--	.6	95	0	79	1.9	6.7
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)												
OCT , 1979												
17...	23	3.8	1.0	4	.1	1.8	.8	76	0	62	1.5	7.8
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)												
OCT , 1979												
18...	26	5.0	1.4	4	.1	2.1	.7	92	0	75	1.5	7.0
JUL , 1980												
16...	26	5.0	1.3	3	.1	--	.7	100	0	82	2.5	5.8
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)												
OCT , 1979												
17...	26	5.3	1.4	4	.1	2.2	.8	98	0	80	2.0	6.7
JUL , 1980												
16...	25	5.5	1.5	4	.1	--	.7	100	0	82	2.0	5.5
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)												
OCT , 1979												
18...	26	5.6	1.6	5	.1	2.4	.8	100	0	82	3.2	6.3
JUL , 1980												
16...	--	--	--	--	--	--	--	110	0	90	2.2	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)												
OCT , 1979												
17...	18	3.3	5.6	21	.3	6.3	.7	66	0	54	1.1	5.7
JUL , 1980												
15...	18	3.4	5.9	18	.3	--	.7	66	0	54	1.3	4.5

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)												
OCT , 1979												
17...	2.0	.0	9.7	106	98	.14	2.80	.42	.02	.44	.02	.02
JUL , 1980												
15...	1.2	.1	9.5	107	99	.15	2.98	.45	.01	.46	.02	.02
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)												
OCT , 1979												
17...	2.3	.1	10	108	96	.15	.61	.58	.01	.59	.03	.04
JUL , 1980												
15...	1.8	--	--	106	--	.14	.59	.59	.00	.59	.00	.00
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)												
OCT , 1979												
17...	.8	--	--	87	--	.12	.04	.29	.00	.29	.02	.02
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)												
OCT , 1979												
18...	1.7	--	--	119	--	.16	4.82	.42	.01	.43	.03	.04
JUL , 1980												
16...	1.3	--	--	113	--	.15	4.88	.46	.01	.47	.01	.01
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)												
OCT , 1979												
17...	1.0	.1	11	110	101	.15	8.91	.44	.01	.45	.00	.00
JUL , 1980												
16...	1.1	.1	10	112	99	.15	8.16	.46	.00	.46	.00	.00
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)												
OCT , 1979												
18...	1.7	--	--	115	--	.16	12.7	.43	.01	.44	.02	.02
JUL , 1980												
16...	--	--	--	--	--	--	--	--	--	--	--	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)												
OCT , 1979												
17...	11	.1	7.4	83	85	.11	.07	.01	.00	.01	.01	.01
JUL , 1980												
15...	11	.0	7.4	92	84	.13	.05	.03	.00	.03	.00	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)												
OCT , 1979												
17...	.23	.25	.69	3.1	.010	.03	.03	.01	100	1	3	0
JUL , 1980												
15...	.05	.07	.53	2.3	.010	.00	.03	.00	200	0	30	0
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)												
OCT , 1979												
17...	.00	.01	.60	2.7	.010	.03	.03	.01	100	1	20	0
JUL , 1980												
15...	--	--	--	--	.010	.03	.03	.01	--	1	30	--
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)												
OCT , 1979												
17...	--	--	--	--	.010	.03	.03	.01	--	1	0	--
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)												
OCT , 1979												
18...	--	--	--	--	.010	.03	.03	.01	--	1	30	--
JUL , 1980												
16...	--	--	--	--	.020	.03	.06	.01	--	1	40	--
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)												
OCT , 1979												
17...	.76	.76	1.2	5.4	.010	.00	.03	.00	100	2	10	0
JUL , 1980												
16...	.22	.22	.68	3.0	.010	.03	.03	.01	200	2	40	0
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)												
OCT , 1979												
18...	--	--	--	--	.010	.06	.03	.02	--	1	10	--
JUL , 1980												
16...	--	--	--	--	--	--	--	--	--	--	--	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)												
OCT , 1979												
17...	.27	.28	.29	1.3	.010	.03	.03	.01	100	1	30	0
JUL , 1980												
15...	.31	.31	.34	1.5	.010	.03	.03	.01	0	0	20	0

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	BORON, DIS-SOLVED (UG/L AS B)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)											
OCT , 1979											
17...	0	0	<10	1	0	160	110	50	0	1	10
JUL , 1980											
15...	6	3	10	0	0	230	180	50	0	2	10
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)											
OCT , 1979											
17...	10	1	10	1	0	60	50	10	0	2	0
JUL , 1980											
15...	--	4	10	0	0	--	--	10	0	--	--
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)											
OCT , 1979											
17...	--	8	<10	0	0	--	--	30	0	--	--
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)											
OCT , 1979											
18...	--	1	<10	1	2	--	--	50	0	--	--
JUL , 1980											
16...	--	1	10	0	0	--	--	40	0	--	--
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)											
OCT , 1979											
17...	10	2	<10	0	3	120	90	30	0	2	10
JUL , 1980											
16...	6	3	10	0	0	170	150	20	0	2	10
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)											
OCT , 1979											
18...	--	1	10	0	0	--	--	30	0	--	--
JUL , 1980											
16...	--	--	--	--	--	--	--	--	--	--	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)											
OCT , 1979											
17...	20	0	<10	0	0	60	50	10	0	2	0
JUL , 1980											
15...	20	4	<10	0	1	90	90	0	0	1	10

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)
04044554 - BIG C NR SANDS STATION,MI (LAT 46 24 07 LONG 087 20 47)											
OCT , 1979											
17...	5	5	.3	0	0	0	0	30	0	5.5	.00
JUL , 1980											
15...	4	6	.1	2	0	0	0	30	2	3.7	.00
04044557 - PETERSON C NR SANDS STATION,MI (LAT 46 24 44 LONG 087 21 53)											
OCT , 1979											
17...	0	1	.3	0	1	0	0	30	7	3.6	.00
JUL , 1980											
15...	--	1	<.1	--	--	--	--	--	4	--	--
04044558 - NORBY C NR SANDS,MI (LAT 46 24 07 LONG 087 21 38)											
OCT , 1979											
17...	--	4	.3	--	--	--	--	--	4	--	--
04044560 - BIG C NR SANDS,MI (LAT 46 24 43 LONG 087 19 57)											
OCT , 1979											
18...	--	0	.3	--	--	--	--	--	4	--	--
JUL , 1980											
16...	--	2	<.1	--	--	--	--	--	0	--	--
04044563 - BIG CREEK NEAR HARVEY, MICH. (LAT 46 26 04 LONG 087 19 04)											
OCT , 1979											
17...	9	1	.3	4	0	0	0	40	20	2.4	.00
JUL , 1980											
16...	7	3	<.1	0	0	0	0	40	7	7.2	.00
04044567 - BIG C NR BEAVER GROVE,MI (LAT 46 27 55 LONG 087 19 07)											
OCT , 1979											
18...	--	1	.3	--	--	--	--	--	7	--	--
JUL , 1980											
15...	--	--	--	--	--	--	--	--	--	--	--
04044570 - CEDAR C NR SANDS, MI (LAT 46 26 11 LONG 087 24 20)											
OCT , 1979											
17...	0	0	.3	1	0	0	0	20	0	3.0	.00
JUL , 1980											
15...	9	1	<.1	0	0	0	0	20	1	2.5	.00

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)												
OCT , 1979												
18...	1000	11	148	8.0	-1.0	5.0	--	--	11.9	96	73	6
JUL , 1980												
15...	1030	8.3	152	7.8	22.0	9.0	--	--	10.7	95	71	0
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)												
OCT , 1979												
17...	1630	13	145	7.8	9.0	7.0	5	1.0	11.2	94	73	2
JUL , 1980												
15...	1230	13	158	7.8	26.0	10.0	0	.45	10.1	92	71	0
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)												
OCT , 1979												
18...	1010	19	135	7.7	2.0	4.0	--	--	11.8	91	71	0
JUL , 1980												
16...	0900	18	152	7.9	19.0	10.0	--	--	11.0	100	--	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)												
OCT , 1979												
17...	0955	.02	115	7.3	5.0	6.5	50	4.0	8.1	68	58	7
JUL , 1980												
15...	1010	.02	159	7.2	24.0	13.0	--	--	6.3	62	68	3
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)												
JUL , 1980												
15...	1130	5.3	216	8.0	26.0	8.0	1	.40	9.9	87	--	--
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)												
OCT , 1979												
17...	1730	11	220	8.0	11.0	7.5	--	--	11.0	93	100	10
JUL , 1980												
15...	1145	9.8	219	7.7	22.0	9.0	--	--	10.5	93	99	1
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)												
OCT , 1979												
17...	1730	20	188	7.9	7.0	7.0	5	1.0	11.0	92	94	4
JUL , 1980												
15...	1615	18	195	7.9	25.0	10.5	1	.25	10.4	95	95	0

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	SODIUM+ POTAS- SIUM DIS- SOLVED (MG/L AS NA)	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)												
OCT , 1979												
18...	22	4.4	1.9	7	.1	2.5	.6	82	0	67	1.3	5.7
JUL , 1980												
15...	21	4.5	2.1	6	.1	--	.6	86	0	71	2.2	5.2
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)												
OCT , 1979												
17...	22	4.4	1.7	6	.1	2.3	.6	87	0	71	2.2	5.4
JUL , 1980												
15...	21	4.5	1.8	5	.1	--	.6	92	0	75	2.3	4.2
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)												
OCT , 1979												
18...	21	4.5	1.8	7	.1	2.5	.7	86	0	71	2.7	5.4
JUL , 1980												
16...	--	--	--	--	--	--	--	88	0	72	1.8	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)												
OCT , 1979												
17...	18	3.2	3.3	14	.2	3.8	.5	62	0	51	5.0	5.3
JUL , 1980												
15...	21	3.8	4.1	11	.2	--	.6	80	0	66	8.1	5.2
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)												
JUL , 1980												
15...	--	--	--	--	--	--	.7	120	0	98	1.9	9.0
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)												
OCT , 1979												
17...	31	6.4	2.6	7	.1	3.3	.7	110	0	90	1.8	9.8
JUL , 1980												
15...	29	6.5	2.8	6	.1	--	.7	120	0	98	3.8	8.5
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)												
OCT , 1979												
17...	28	5.9	2.3	7	.1	3.0	.7	110	0	90	2.2	8.7
JUL , 1980												
15...	28	6.1	2.4	5	.1	--	.7	120	0	98	2.4	6.9

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)												
OCT , 1979												
18...	3.3	--	--	96	--	.13	2.85	.00	.01	.01	.04	.05
JUL , 1980												
15...	3.3	--	--	95	--	.13	2.13	.03	.00	.03	.00	.00
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)												
OCT , 1979												
17...	2.1	.1	9.5	92	89	.13	3.23	.07	.00	.07	.00	.00
JUL , 1980												
15...	2.3	.1	8.9	97	89	.13	3.51	.09	.00	.09	.02	.02
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)												
OCT , 1979												
18...	2.3	--	--	82	--	.11	4.21	.18	.00	.18	.02	.02
JUL , 1980												
16...	--	--	--	--	--	--	--	--	--	--	--	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)												
OCT , 1979												
17...	8.3	.0	8.7	94	78	.13	.01	.01	.00	.01	.00	.00
JUL , 1980												
15...	7.6	--	--	110	--	.15	.01	.03	.00	.03	.02	.02
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)												
JUL , 1980												
15...	6.1	.1	--	143	75	.19	2.05	.10	.00	.10	.02	.02
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)												
OCT , 1979												
17...	5.6	--	--	122	--	.17	3.62	.06	.00	.06	.01	.01
JUL , 1980												
15...	5.8	--	--	138	--	.19	3.65	.09	.00	.09	.00	.00
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)												
OCT , 1979												
17...	4.6	.1	10	123	115	.17	6.64	.02	.02	.04	.03	.04
JUL , 1980												
15...	3.9	.1	10	120	117	.16	5.93	.06	.00	.06	.00	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)												
OCT , 1979												
18...	--	--	--	--	.010	.03	.03	.01	--	1	20	--
JUL , 1980												
15...	--	--	--	--	.010	.00	.03	.00	--	1	40	--
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)												
OCT , 1979												
17...	.14	.14	.21	.93	.010	.00	.03	.00	100	1	40	1
JUL , 1980												
15...	.10	.12	.21	.93	.010	.03	.03	.01	100	2	30	0
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)												
OCT , 1979												
18...	--	--	--	--	.010	.00	.03	.00	--	2	0	--
JUL , 1980												
16...	--	--	--	--	--	--	--	--	--	--	--	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)												
OCT , 1979												
17...	.56	.56	.57	2.5	.050	.00	.15	.00	200	1	30	1
JUL , 1980												
15...	--	--	--	--	.080	.00	.25	.00	--	0	40	--
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)												
JUL , 1980												
15...	.16	.18	.28	1.2	.084	.00	.00	.00	100	2	--	--
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)												
OCT , 1979												
17...	--	--	--	--	.010	.03	.03	.01	--	1	1	--
JUL , 1980												
15...	--	--	--	--	.020	.00	.06	.00	--	1	40	--
04044583 - CHERRY C NR HARVEY,MI (LAT 46 24 07 LONG 087 21 53)												
OCT , 1979												
17...	.07	.10	.14	.62	.010	.03	.03	.01	100	1	20	0
JUL , 1980												
15...	.06	.06	.12	.53	.000	.00	.00	.00	100	1	30	0

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	BORON, DIS-SOLVED (UG/L AS B)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 08 LONG 087 22 46)											
OCT , 1979 18...	--	0	20	0	2	--	--	10	0	--	--
JUL , 1980 15...	--	4	10	0	4	--	--	100	0	--	--
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)											
OCT , 1979 17...	0	0	10	0	0	80	70	10	0	1	10
JUL , 1980 15...	2	4	30	0	0	140	130	10	0	2	10
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)											
OCT , 1979 18...	--	0	<10	2	0	--	--	20	0	--	--
JUL , 1980 16...	--	--	--	--	--	--	--	--	--	--	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)											
OCT , 1979 17...	20	0	10	1	17	2100	2000	130	0	1	250
JUL , 1980 15...	--	6	10	0	0	--	--	100	1	--	--
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)											
JUL , 1980 15...	10	--	20	0	--	110	--	--	0	--	30
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)											
OCT , 1979 17...	--	0	<10	1	2	--	--	20	0	--	--
JUL , 1980 15...	--	2	10	0	0	--	--	70	0	--	--
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)											
OCT , 1979 17...	0	0	<10	0	0	80	70	10	0	2	10
JUL , 1980 15...	4	3	10	0	0	140	140	0	0	2	20

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	MANGA-NESE, SUS-PENDED RECOV. (UG/L AS MN)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	MOLYB-DENUM, DIS-SOLVED (UG/L AS MO)	NICKEL, DIS-SOLVED (UG/L AS NI)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	STRON-TIUM, DIS-SOLVED (UG/L AS SR)	ZINC, DIS-SOLVED (UG/L AS ZN)	CARBON, ORGANIC DIS-SOLVED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)
04044572 - CEDAR C NR GENTIAN,MI (LAT 46 27 04 LONG 087 22 46)											
OCT , 1979 18...	--	0	.3	--	--	--	--	--	4	--	--
JUL , 1980 15...	--	10	.4	--	--	--	--	--	30	--	--
04044573 - CEDAR C NR HARVEY,MI (LAT 46 27 20 LONG 087 21 42)											
OCT , 1979 17...	10	0	.3	12	1	0	0	30	10	3.6	.00
JUL , 1980 15...	0	2	<.1	0	0	0	0	30	5	4.3	.00
04044577 - CEDAR C NR BEAVER GROVE, MI (LAT 46 28 23 LONG 087 19 46)											
OCT , 1979 19...	--	2	.3	--	--	--	--	--	0	--	--
JUL , 1980 16...	--	--	--	--	--	--	--	--	--	--	--
04044580 - CHERRY C NR CASCADE,MI (LAT 46 27 43 LONG 087 24 20)											
OCT , 1979 17...	240	6	.3	3	1	0	0	20	10	11	.00
JUL , 1980 15...	--	20	.2	--	--	--	--	--	20	--	--
04044581 - CHERRY C NR SANDS, MI (LAT 46 27 47 LONG 087 23 31)											
JUL , 1980 15...	--	--	<.1	0	0	0	0	--	--	3.4	.00
04044582 - CHERRY C NR GENTIAN,MI (LAT 46 28 02 LONG 087 22 52)											
OCT , 1979 17...	--	7	.3	--	--	--	--	--	5	--	--
JUL , 1980 15...	--	5	.3	--	--	--	--	--	0	--	--
04044583 - CHERRY C NR HARVEY,MI (LAT 46 28 07 LONG 087 21 53)											
OCT , 1979 17...	9	1	.5	0	0	0	0	40	0	3.0	.00
JUL , 1980 15...	20	2	<.1	2	0	0	0	40	3	3.0	.00

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)												
OCT , 1979												
18...	0945	27	188	8.0	4.0	5.0	--	--	11.4	90	91	1
JUL , 1980												
16...	0850	25	192	7.9	19.0	9.0	--	--	10.4	92	--	--
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)												
OCT , 1979												
17...	1430	3.2	193	8.0	10.5	7.0	5	1.0	11.3	95	100	2
JUL , 1980												
15...	1530	3.1	204	7.9	26.0	10.0	1	.65	10.6	97	--	--
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)												
OCT , 1979												
17...	1530	2.5	195	8.0	12.0	7.5	--	--	11.5	97	100	10
JUL , 1980												
15...	1400	2.4	209	7.9	23.5	11.0	--	--	10.4	96	99	0
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)												
OCT , 1979												
17...	1400	.06	222	7.6	12.0	7.5	--	--	8.5	72	110	12
JUL , 1980												
15...	1530	.02	214	7.3	23.5	11.5	--	--	7.9	70	98	0
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)												
OCT , 1979												
17...	1300	9.7	207	7.9	11.0	7.5	10	1.0	11.0	92	110	3
JUL , 1980												
15...	1430	8.9	216	8.0	26.0	11.0	1	.80	9.8	91	110	0
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)												
OCT , 1979												
17...	1000	9.8	210	8.0	10.0	7.5	--	--	11.3	96	110	3
JUL , 1980												
15...	1630	8.5	224	7.9	23.5	13.0	--	--	10.0	97	--	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	SODIUM+ POTAS-SIUM DIS-SOLVED (MG/L AS NA)	POTAS-SIUM, DIS-SOLVED (MG/L AS K)	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 28 18)												
OCT , 1979												
18...	27	5.6	2.4	7	.1	3.2	.8	110	0	90	1.8	7.5
JUL , 1980												
16...	--	--	--	--	--	--	.8	110	0	90	2.2	6.1
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)												
OCT , 1979												
17...	30	6.3	1.2	3	.1	1.8	.6	120	0	98	1.9	6.1
JUL , 1980												
15...	28	--	1.3	0	--	--	.5	120	0	98	2.4	4.8
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)												
OCT , 1979												
17...	30	6.0	1.2	3	.1	1.8	.6	110	0	90	1.8	6.0
JUL , 1980												
15...	29	6.2	1.2	3	.1	--	.6	120	0	98	2.4	5.2
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)												
OCT , 1979												
17...	34	6.1	1.2	3	.1	2.0	.8	120	0	98	4.8	9.9
JUL , 1980												
15...	30	5.5	1.2	3	.1	--	1.1	120	0	98	9.6	8.6
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)												
OCT , 1979												
17...	33	7.1	1.4	4	.1	2.1	.7	130	0	107	2.6	6.8
JUL , 1980												
15...	31	7.0	1.4	3	.1	--	.7	140	0	110	2.2	5.4
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)												
OCT , 1979												
17...	32	6.9	1.4	4	.1	2.2	.8	130	0	107	2.1	7.1
JUL , 1980												
15...	--	--	--	--	--	--	--	130	0	107	2.6	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS N)	NITRO-GEN, AMMONIA TOTAL (MG/L AS NH4)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)												
OCT , 1979 18...	4.2	--	--	108	--	.15	7.87	.15	.00	.15	.03	.04
JUL , 1980 16...	4.0	--	--	126	--	.17	8.61	.15	.01	.16	.02	.02
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)												
OCT , 1979 17...	3.3	.1	9.4	120	116	.16	1.04	.11	.01	.12	.04	.05
JUL , 1980 15...	3.1	.1	8.9	127	88	.17	1.06	.15	.00	.15	.01	.01
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)												
OCT , 1979 17...	2.8	--	--	109	--	.15	.74	.09	.00	.09	.01	.01
JUL , 1980 15...	3.5	--	--	128	--	.17	.83	.14	.00	.14	.01	.01
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)												
OCT , 1979 17...	3.0	--	--	124	--	.17	.02	.08	.00	.08	.01	.01
JUL , 1980 15...	3.5	--	--	135	--	.18	.01	.13	.00	.13	.01	.01
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)												
OCT , 1979 17...	2.7	.0	10	129	126	.18	3.38	.13	.00	.13	.01	.01
JUL , 1980 15...	2.9	.1	9.7	138	127	.19	3.32	.15	.00	.15	.01	.01
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)												
OCT , 1979 17...	3.0	--	--	124	--	.17	3.28	.11	.01	.12	.02	.02
JUL , 1980 15...	--	--	--	--	--	--	--	--	--	--	--	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	NITRO-GEN, ORGANIC TOTAL (MG/L AS N)	NITRO-GEN,AM-MONIA + ORGANIC TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS N)	NITRO-GEN, TOTAL (MG/L AS NO3)	PHOS-PHORUS, TOTAL (MG/L AS P)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS PO4)	PHOS-PHORUS, TOTAL (MG/L AS PO4)	PHOS-PHORUS, ORTHOPH OSPHATE TOTAL (MG/L AS P)	ALUM-INUM, DIS-SOLVED (UG/L AS AL)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)	BERYL-LIUM, DIS-SOLVED (UG/L AS BE)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)												
OCT , 1979 18...	--	--	--	--	.020	.06	.06	.02	--	1	30	--
JUL , 1980 16...	--	--	--	--	.040	.09	.12	.03	--	1	--	--
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)												
OCT , 1979 17...	.06	.10	.22	.97	.010	.03	.03	.01	200	1	20	0
JUL , 1980 15...	.04	.05	.20	.89	.040	.12	.12	.04	100	2	40	0
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)												
OCT , 1979 17...	--	--	--	--	.010	.00	.03	.00	--	1	70	--
JUL , 1980 15...	--	--	--	--	.010	.03	.03	.01	--	1	40	--
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)												
OCT , 1979 17...	--	--	--	--	.010	.00	.03	.00	--	1	20	--
JUL , 1980 15...	--	--	--	--	.010	.00	.03	.00	--	1	30	--
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)												
OCT , 1979 17...	.11	.12	.25	1.1	.010	.00	.03	.00	100	2	0	0
JUL , 1980 15...	.07	.08	.23	1.0	.010	.00	.03	.00	0	2	30	0
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)												
OCT , 1979 17...	--	--	--	--	.010	.06	.03	.02	--	1	0	--
JUL , 1980 15...	--	--	--	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	BORON, DIS-SOLVED (UG/L AS B)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, SUS-PENDED RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)											
OCT , 1979 18...	--	1	<10	0	0	--	--	10	0	--	--
JUL , 1980 16...	--	--	10	0	--	--	--	--	0	--	--
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)											
OCT , 1979 17...	0	0	10	2	1	90	80	10	0	2	0
JUL , 1980 15...	0	2	30	0	12	170	--	--	1	2	10
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)											
OCT , 1979 17...	--	0	<10	0	0	--	--	20	0	--	--
JUL , 1980 15...	--	3	10	0	0	--	--	70	0	--	--
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)											
OCT , 1979 17...	--	1	<10	0	2	--	--	30	0	--	--
JUL , 1980 15...	--	4	10	0	0	--	--	140	0	--	--
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)											
OCT , 1979 17...	10	0	<10	1	0	110	60	50	0	2	0
JUL , 1980 15...	0	5	20	0	0	170	160	10	0	2	20
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)											
OCT , 1979 17...	--	0	10	2	1	--	--	30	0	--	--
JUL , 1980 15...	--	--	--	--	--	--	--	--	--	--	--

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	MANGANESE, SUSPENDED RECOV. (UG/L AS MN)	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY DISSOLVED (UG/L AS HG)	MOLYBDENUM, DISSOLVED (UG/L AS MO)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	ZINC, DISSOLVED (UG/L AS ZN)	CARBON, ORGANIC DISSOLVED (MG/L AS C)	CYANIDE TOTAL (MG/L AS CN)
04044586 - CHERRY C NR BEAVER GROVE,MI (LAT 46 28 45 LONG 087 20 18)											
OCT , 1979 18...	--	4	.3	--	--	--	--	--	8	--	--
JUL , 1980 16...	--	--	.1	--	--	--	--	--	--	--	--
04044591 - SILVER C NR CASCADE,MI (LAT 46 28 22 LONG 087 23 48)											
OCT , 1979 17...	0	0	.3	0	0	0	0	30	4	3.0	.00
JUL , 1980 15...	6	4	<.1	0	0	0	0	29	15	5.3	--
04044592 - SILVER C NR SANDS,MI (LAT 46 28 48 LONG 087 23 07)											
OCT , 1979 17...	--	3	.3	--	--	--	--	--	0	--	--
JUL , 1980 15...	--	7	.2	--	--	--	--	--	1	--	--
04044593 - UNNAMED TRIB TO SILVER C NR HARVEY,MI (LAT 46 28 56 LONG 087 23 01)											
OCT , 1979 17...	--	10	.4	--	--	--	--	--	1	--	--
JUL , 1980 15...	--	70	.4	--	--	--	--	--	5	--	--
04044595 - SILVER C AT HARVEY,MI (LAT 46 29 24 LONG 087 22 19)											
OCT , 1979 17...	0	1	<.1	3	5	0	0	40	7	7.9	.00
JUL , 1980 15...	20	2	<.1	0	0	0	0	40	3	9.2	--
04044597 - SILVER C NR HARVEY,MI (LAT 46 29 22 LONG 087 20 16)											
OCT , 1979 17...	--	1	.3	--	--	--	--	--	3	--	--
JUL , 1980 15...	--	--	--	--	--	--	--	--	--	--	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27)										
MAY , 1980										
05...	1300	2.7	147	7.9	16.0	10.5	90	1.1	10.9	100
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23)										
MAY , 1980										
05...	1715	20	184	8.1	16.0	14.5	75	.55	9.8	99
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26)										
MAY , 1980										
05...	1500	57	230	7.8	16.0	11.0	22	.80	10.4	96
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41)										
MAY , 1980										
06...	1130	24	199	8.2	15.0	9.5	30	1.0	11.2	100
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20)										
MAY , 1980										
07...	1230	13	125	7.7	7.0	10.5	30	1.0	10.9	98
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38)										
MAY , 1980										
07...	1530	9.3	128	7.7	7.0	8.0	14	1.0	11.5	100
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02)										
MAY , 1980										
09...	1305	31	141	7.9	6.0	9.5	4	.50	11.6	104
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31)										
MAY , 1980										
06...	1400	20	144	8.0	15.0	10.0	14	1.0	11.0	100
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02)										
MAY , 1980										
08...	1125	5.0	133	7.7	6.5	6.0	29	1.2	11.6	95
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57)										
MAY , 1980										
08...	1210	20	92	7.6	7.0	6.0	30	.90	11.5	94
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01)										
MAY , 1980										
08...	1500	24	97	7.2	6.0	8.0	19	1.0	11.5	100

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	COLI- FORM, FECAL, 0.7 UM-MF (COLS./ 100 ML)	STREP- TOCOCCI FECAL, KF AGAR (COLS. PER 100 ML)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27)										
MAY , 1980 05...	K5	K4	72	11	19	5.9	3.6	10	.2	.8
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23)										
MAY , 1980 05...	K9	K1	100	10	23	11	.7	1	.0	.9
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26)										
MAY , 1980 05...	K7	K1	130	7	28	14	.7	1	.0	.8
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41)										
MAY , 1980 06...	K10	K2	110	3	24	12	.5	1	.0	.5
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20)										
MAY , 1980 07...	K6	K2	72	16	16	7.7	.7	2	.0	.6
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38)										
MAY , 1980 07...	K5	K2	68	9	17	6.3	.9	3	.0	.7
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02)										
MAY , 1980 09...	<1	<1	79	14	23	5.2	1.1	3	.1	.6
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31)										
MAY , 1980 06...	K18	K4	71	8	22	3.9	.9	3	.0	.7
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02)										
MAY , 1980 08...	K7	K3	72	9	21	4.7	.8	2	.0	.8
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57)										
MAY , 1980 08...	K3	K15	47	9	13	3.6	.8	4	.1	.6
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01)										
MAY , 1980 08...	K1	K2	51	10	13	4.5	.9	4	.1	.7

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	BICAR-BONATE (MG/L AS HCO3)	CAR-BONATE (MG/L AS CO3)	ALKA-LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS-SOLVED (MG/L AS CO2)	SULFATE DIS-SOLVED (MG/L AS SO4)	CHLO-RIDE, DIS-SOLVED (MG/L AS CL)	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27)										
MAY , 1980 05...	74	0	61	1.5	6.3	7.1	.0	4.9	109	85
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23)										
MAY , 1980 05...	110	0	90	1.4	5.7	1.5	.0	2.4	115	100
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26)										
MAY , 1980 05...	150	0	123	3.8	5.3	1.3	.1	3.5	143	128
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41)										
MAY , 1980 06...	130	0	107	1.3	4.1	.7	.0	2.2	116	108
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20)										
MAY , 1980 07...	68	0	56	2.2	6.3	.7	.1	3.5	93	69
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38)										
MAY , 1980 07...	72	0	59	2.3	5.2	.7	.1	5.0	92	72
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02)										
MAY , 1980 09...	79	0	65	1.6	5.6	.7	.1	7.8	81	84
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31)										
MAY , 1980 06...	88	0	72	1.4	5.2	.5	.1	6.0	83	83
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02)										
MAY , 1980 08...	77	0	63	2.5	5.1	.5	.1	6.3	87	78
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57)										
MAY , 1980 08...	47	0	39	1.9	5.7	.6	.1	5.2	68	53
04044786 - SAHLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 48 03 LONG 086 01 01)										
MAY , 1980 08...	50	0	41	5.0	5.4	.6	.1	6.3	69	57

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	PHOS-PHORUS, DIS-SOLVED (MG/L AS P)	ARSENIC DIS-SOLVED (UG/L AS AS)	BARIUM, DIS-SOLVED (UG/L AS BA)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27)										
MAY , 1980 05...	.15	.79	.10	<.44	.01	.03	.11	.010	3	30
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23)										
MAY , 1980 05...	.16	6.21	.04	<.18	.03	.10	.07	.010	3	10
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26)										
MAY , 1980 05...	.19	22.0	.14	<.62	.01	.03	.15	.010	3	20
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41)										
MAY , 1980 06...	.16	7.52	.06	.27	.00	.00	.06	.010	2	20
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20)										
MAY , 1980 07...	.13	3.26	.04	<.18	.01	.03	.05	.000	2	20
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38)										
MAY , 1980 07...	.13	2.31	.18	<.80	.01	.03	.19	.010	2	20
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02)										
MAY , 1980 09...	.11	6.78	.19	<.84	.00	.00	.19	.000	3	30
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31)										
MAY , 1980 06...	.11	4.48	.10	<.44	.00	.00	.10	.010	2	20
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02)										
MAY , 1980 08...	.12	1.17	.04	<.18	.00	.00	.04	.000	2	30
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57)										
MAY , 1980 08...	.09	3.67	.13	.58	.00	.00	.13	.010	3	0
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01)										
MAY , 1980 08...	.09	4.47	.14	<.62	.00	.00	.14	.000	3	30

STREAMS TRIBUTARY TO LAKE SUPERIOR--Continued

DATE	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)
04044744 - MUNISING FALLS CREEK AT MUNISING, MICHIGAN (LAT 46 25 28 LONG 086 37 27)										
MAY , 1980 05...	1	23	240	0	20	<.1	0	0	0	.00
04044750 - MINERS RIVER NR VAN MEER, MICHIGAN (LAT 46 25 12 LONG 086 31 23)										
MAY , 1980 05...	3	23	80	0	10	<.1	0	0	0	.00
04044755 - MINERS RIVER NR MUNISING, MICHIGAN (LAT 46 29 18 LONG 086 32 26)										
MAY , 1980 05...	0	23	90	0	20	<.1	0	0	20	.00
04044762 - MOSQUITO RIVER NR MELSTRAND, MICHIGAN (LAT 46 31 07 LONG 086 28 41)										
MAY , 1980 06...	1	22	50	0	9	<.1	0	0	0	.00
04044765 - CHAPEL CREEK NR MELSTRAND, MICHIGAN (LAT 46 32 54 LONG 086 26 20)										
MAY , 1980 07...	0	12	100	2	10	<.1	0	0	4	.01
04044766 - SPRAY CREEK NR MELSTRAND, MICHIGAN (LAT 46 33 27 LONG 086 24 38)										
MAY , 1980 07...	4	10	40	2	10	<.1	0	0	4	.00
04044770 - BEAVER CREEK NR MELSTRAND, MICHIGAN (LAT 46 34 39 LONG 086 21 02)										
MAY , 1980 09...	0	16	10	0	2	<.1	0	0	9	.00
04044775 - SEVENMILE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 37 15 LONG 086 15 31)										
MAY , 1980 06...	3	23	40	0	4	<.1	0	0	0	.00
04044782 - SULLIVAN CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 39 19 LONG 086 11 02)										
MAY , 1980 08...	0	19	190	0	10	<.1	0	0	20	.01
04044785 - HURRICANE RIVER NR GRAND MARAIS, MICHIGAN (LAT 46 39 48 LONG 086 09 57)										
MAY , 1980 08...	2	19	0	0	0	<.1	0	0	5	.00
04044786 - SABLE CREEK NR GRAND MARAIS, MICHIGAN (LAT 46 40 03 LONG 086 01 01)										
MAY , 1980 08...	1	19	100	0	9	<.1	0	0	7	.01

ANALYSIS OF SAMPLES COLLECTED AT MISCELLANEOUS SITES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE MICHIGAN

DATE	TIME	STREAM-FLOW, INSTAN-TANEOUS (CFS)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH FIELD (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)	TUR-BID-ITY (NTU)	OXYGEN, DIS-SOLVED (MG/L)	OXYGEN, DIS-SOLVED (PER-CENT SATUR-ATION)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 066 07 08)												
MAY , 1980 15...	1130	158	320	8.3	12.0	11.5	4	1.0	11.0	102	160	0
04126758 - PLATTE RIVER AT WEIR ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12)												
MAY , 1980 15...	1000	173	330	8.3	10.0	11.0	2	1.4	10.6	96	160	0
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40)												
MAY , 1980 13...	1030	6.1	320	8.2	13.0	12.0	0	1.3	10.8	102	160	0
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26)												
MAY , 1980 12...	1100	16	330	8.1	15.0	18.0	0	1.5	9.1	98	170	14
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46)												
MAY , 1980 14...	1450	54	280	8.2	10.0	11.0	0	.40	10.6	97	140	0
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07)												
MAY , 1980 14...	1000	28	360	7.9	7.0	8.0	0	.80	10.5	90	180	18

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	CALCIUM DIS- SOLVED (MG/L AS CA)	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08)												
MAY , 1980 15...	46	12	4.2	5	.1	.6	200	0	160	1.6	11	4.3
04126758 - PLATTE RIVER AT WEIR ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12)												
MAY , 1980 15...	46	12	4.1	5	.1	.6	200	0	160	1.6	11	4.3
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 30 LONG 086 03 40)												
MAY , 1980 13...	44	12	2.2	3	.1	.6	200	0	160	2.0	11	3.1
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26)												
MAY , 1980 12...	45	14	2.9	4	.1	.6	190	0	160	2.4	15	2.8
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46)												
MAY , 1980 14...	36	13	2.9	4	.1	.5	180	0	150	1.8	11	1.7
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07)												
MAY , 1980 14...	50	14	3.4	4	.1	.6	200	0	160	4.0	26	3.7

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTARY TO LAKE MICHIGAN--Continued

DATE	FLUO-RIDE, DIS-SOLVED (MG/L AS F)	SILICA, DIS-SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS-SOLVED (MG/L)	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	SOLIDS, DIS-SOLVED (TONS PER DAY)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 DIS-SOLVED (MG/L AS N)	ARSENIC DIS-SOLVED (UG/L AS AS)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08)												
MAY , 1980 15...	.2	5.6	180	183	.24	76.8	.19	.84	.01	.03	.20	3
04126758 - PLATTE RIVER AT WEIR ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12)												
MAY , 1980 15...	.2	5.5	179	183	.24	83.6	.18	.80	.01	.03	.19	3
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 38 LONG 086 03 40)												
MAY , 1980 13...	.1	6.1	173	180	.24	2.87	.43	1.9	.01	.03	.44	1
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26)												
MAY , 1980 12...	.3	6.9	190	184	.26	8.41	.62	2.7	.01	.03	.63	1
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46)												
MAY , 1980 14...	.5	6.8	153	161	.21	22.3	.04	.18	.00	.00	.04	2
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07)												
MAY , 1980 14...	.5	6.9	214	205	.29	16.4	.24	1.1	.00	.00	.24	2

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

STREAMS TRIBUTRAY TO LAKE MICHIGAN--Continued

DATE	BARIUM, DIS-SOLVED (UG/L AS BA)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, DIS-SOLVED (UG/L AS PB)	MANGA-NESE, DIS-SOLVED (UG/L AS MN)	MERCURY DIS-SOLVED (UG/L AS HG)	SELE-NIUM, DIS-SOLVED (UG/L AS SE)	SILVER, DIS-SOLVED (UG/L AS AG)	ZINC, DIS-SOLVED (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)
04126755 - PLATTE RIVER AT M-22 NR HONOR, MICHIGAN (LAT 44 42 39 LONG 086 07 08)											
MAY , 1980 15...	30	5	3	0	0	0	<.1	0	0	0	.00
04126758 - PLATTE RIVER AT WEIR ON LOON LAKE NR HONOR, MICH (LAT 44 43 12 LONG 086 08 12)											
MAY , 1980 15...	30	3	3	0	0	1	.1	0	0	9	.00
04126765 - OTTER CREEK AT OTTER LAKE NEAR EMPIRE MI (LAT 44 44 38 LONG 086 03 40)											
MAY , 1980 13...	20	3	3	1	0	2	<.1	0	0	9	.90
04126767 - OTTER CREEK AT ARAL ROAD NR EMPIRE, MICHIGAN (LAT 44 45 42 LONG 086 04 26)											
MAY , 1980 12...	30	8	4	10	0	5	<.1	0	0	8	.00
04126802 - CRYSTAL RIVER NR GLEN ARBOR, MICHIGAN (LAT 44 54 10 LONG 085 57 46)											
MAY , 1980 14...	40	3	3	0	0	3	<.1	0	0	20	.00
04126810 - SHALDA CREEK NR GLEN ARBOR, MICHIGAN (LAT 44 56 48 LONG 085 53 07)											
MAY , 1980 14...	30	1	2	20	0	6	<.1	0	0	6	.00

ANALYSES OF SAMPLES COLLECTED AT MISCELLANEOUS LAKES

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	TIME	SAMP- LING DEPTH (FT)	SPE- CIFIC CON- DUCT- ANCE (MICRO- MHOS)	PH (UNITS)	TEMPER- ATURE, WATER (DEG C)	COLOR (PLAT- INUM COBALT UNITS)	TUR- BID- ITY (NTU)	OXYGEN, DIS- SOLVED (MG/L)	OXYGEN, DIS- SOLVED (PER- CENT SATUR- ATION)	HARD- NESS (MG/L AS CACO3)	HARD- NESS, NONCAR- BONATE (MG/L CACO3)	CALCIUM DIS- SOLVED (MG/L AS CA)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)												
SEP , 1980 29...	1415	--	627	8.2	19.5	30	1.0	8.6	97	290	77	82
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)												
SEP , 1980 30...	1230	3.0	581	8.2	18.0	15	.80	9.1	98	250	56	70
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)												
SEP , 1980 30...	1130	60	602	7.5	7.0	10	.90	.0	0	260	76	71
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)												
MAY , 1980 15...	1000	--	265	8.1	7.0	2	.80	--	--	130	18	35
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)												
MAY , 1980 13...	1600	1.0	335	8.2	10.0	1	.90	11.1	100	170	14	45
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)												
MAY , 1980 14...	1400	1.0	248	8.6	11.0	6	.65	9.8	90	120	0	34
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)												
JUL , 1980 17...	1230	--	90	7.7	--	5	1.0	--	--	47	0	14
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)												
MAY , 1980 07...	1720	3.0	123	7.7	10.5	35	.70	10.8	98	71	15	16
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 34 00 LONG 086 20 20)												
MAY , 1980 09...	1230	3.0	140	7.9	7.5	8	.50	11.2	96	77	11	23
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)												
NOV , 1979 27...	1515	3.0	75	--	3.5	--	--	--	--	--	--	--
MAY , 1980 08...	1030	3.0	72	7.7	10.5	4	1.0	11.0	100	35	2	11
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)												
MAY , 1980 08...	1550	3.0	95	7.2	10.0	25	.60	12.2	110	48	7	12

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	MAGNE- SIUM, DIS- SOLVED (MG/L AS MG)	SODIUM, DIS- SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD- SORP- TION RATIO	POTAS- SIUM, DIS- SOLVED (MG/L AS K)	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)												
SEP , 1980 29...	20	4.7	3	.1	2.0	278	0	210	2.6	56	12	.2
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)												
SEP , 1980 30...	19	5.7	5	.2	2.2	236	0	194	2.4	59	14	.2
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)												
SEP , 1980 30...	19	5.8	5	.2	2.4	250	0	180	11	56	15	.2
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)												
MAY , 1980 15...	11	5.0	8	.2	1.0	140	0	110	1.8	21	8.3	.1
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)												
MAY , 1980 13...	14	2.4	3	.1	.7	190	0	160	1.9	13	4.7	.1
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)												
MAY , 1980 14...	9.6	1.6	3	.1	1.0	140	6	120	.6	8.1	3.4	.1
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)												
JUL , 1980 17...	2.8	1.5	6	.1	.6	57	0	47	1.8	7.6	1.2	.1
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)												
MAY , 1980 07...	7.6	.6	2	.0	.7	68	0	56	2.2	5.6	.7	.1
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 34 00 LONG 086 20 20)												
MAY , 1980 09...	4.8	.8	2	.0	.6	81	0	66	1.6	6.0	.6	.1
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)												
NOV , 1979 27...	--	--	--	--	--	--	--	--	--	--	--	--
MAY , 1980 08...	1.9	.6	4	.0	.4	41	0	34	1.3	3.5	.3	.1
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)												
MAY , 1980 08...	4.4	.9	4	.1	.7	50	0	41	5.0	5.3	.6	.1

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)	SOLIDS, SUM OF CONSTI- TUENTS, DIS- SOLVED (MG/L)	SOLIDS, DIS- SOLVED (TONS PER AC-FT)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRATE DIS- SOLVED (MG/L AS NO3)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS N)	NITRO- GEN, NITRITE DIS- SOLVED (MG/L AS NO2)	NITRO- GEN, NO2+NO3 TOTAL (MG/L AS N)	NITRO- GEN, NO2+NO3 DIS- SOLVED (MG/L AS N)	NITRO- GEN, AMMONIA TOTAL (MG/L AS N)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)											
SEP , 1980 29...	6.7	340	310	.46	--	--	--	--	1.0	--	.05
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	4.6	328	291	.45	--	--	--	--	.53	--	.06
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	7.1	333	285	.45	--	--	--	--	.25	--	.77
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)											
MAY , 1980 15...	.9	155	153	.21	.23	E1.0	.00	.00	--	.23	--
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)											
MAY , 1980 13...	4.4	183	180	.25	.44	1.9	.01	.03	--	.45	--
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)											
MAY , 1980 14...	.3	141	133	.19	.00	.00	.01	.03	--	.00	--
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)											
JUL , 1980 17...	2.1	60	59	.08	.29	E1.3	.00	.00	--	.29	--
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)											
MAY , 1980 07...	4.0	89	69	.12	.03	<.13	.02	.07	--	.05	--
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 3 00 LONG 086 20 20)											
MAY , 1980 09...	6.7	84	83	.11	.17	<.75	.01	.03	--	.18	--
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)											
NOV , 1979 27...	--	--	--	--	--	--	--	--	--	--	--
MAY , 1980 08...	4.5	45	43	.06	.00	.00	.00	.00	--	.00	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)											
MAY , 1980 08...	6.4	70	56	.10	.15	<.66	.00	.00	--	.15	--

DATE	NITROGEN, AMMONIA TOTAL (MG/L AS NH4)	NITROGEN, ORGANIC TOTAL (MG/L AS N)	NITROGEN, AMMONIA + ORGANIC TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS N)	NITROGEN, TOTAL (MG/L AS NO3)	PHOSPHORUS, TOTAL (MG/L AS P)	PHOSPHORUS, TOTAL (MG/L AS PO4)	PHOSPHORUS, DISSOLVED (MG/L AS P)	ALUMINUM, DISSOLVED (UG/L AS AL)	ARSENIC DISSOLVED (UG/L AS AS)	BARIUM, DISSOLVED (UG/L AS BA)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)											
SEP , 1980 29...	.06	.72	.77	1.8	7.8	.020	.06	--	--	--	--
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	.07	.66	.72	1.3	5.5	.020	.06	--	--	--	--
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	.93	.63	1.4	1.7	7.3	.060	.18	--	--	--	--
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)											
MAY , 1980 15...	--	--	--	--	--	--	--	.010	40	3	30
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)											
MAY , 1980 13...	--	--	--	--	--	--	--	.010	--	2	30
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)											
MAY , 1980 14...	--	--	--	--	--	--	--	.010	--	1	20
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)											
JUL , 1980 17...	--	--	--	--	--	--	--	.020	0	3	20
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)											
MAY , 1980 07...	--	--	--	--	--	--	--	.000	--	2	20
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 34 00 LONG 086 20 20)											
MAY , 1980 09...	--	--	--	--	--	--	--	.000	--	3	<50
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)											
NOV , 1979 27...	--	--	--	--	--	--	--	--	--	--	--
MAY , 1980 08...	--	--	--	--	--	--	--	.000	--	2	20
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)											
MAY , 1980 08...	--	--	--	--	--	--	--	.000	--	3	30

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	BORON, TOTAL RECOV-ERABLE (UG/L AS B)	CADMIUM DIS-SOLVED (UG/L AS CD)	CHRO-MIUM, DIS-SOLVED (UG/L AS CR)	COBALT, DIS-SOLVED (UG/L AS CO)	COPPER, TOTAL RECOV-ERABLE (UG/L AS CU)	COPPER, DIS-SOLVED (UG/L AS CU)	IRON, TOTAL RECOV-ERABLE (UG/L AS FE)	IRON, DIS-SOLVED (UG/L AS FE)	LEAD, TOTAL RECOV-ERABLE (UG/L AS PB)	LITHIUM DIS-SOLVED (UG/L AS LI)	MANGA-NESE, TOTAL RECOV-ERABLE (UG/L AS MN)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)											
SEP , 1980 29...	50	--	--	--	0	--	120	--	0	--	20
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	60	--	--	--	0	--	70	--	0	--	20
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	50	--	--	--	0	--	90	--	0	--	360
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)											
MAY , 1980 15...	--	1	4	0	--	4	--	1	--	3	--
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)											
MAY , 1980 13...	--	0	13	--	--	--	--	0	--	--	--
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)											
MAY , 1980 14...	--	1	3	--	--	--	--	10	--	--	--
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)											
JUL , 1980 17...	--	2	12	0	--	5	--	10	--	1	--
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)											
MAY , 1980 07...	--	2	11	--	--	--	--	80	--	--	--
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 34 00 LONG 086 20 20)											
MAY , 1980 09...	--	0	18	--	--	--	--	70	--	--	--
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)											
NOV , 1979 27...	--	--	--	--	--	--	--	--	--	--	--
MAY , 1980 08...	--	1	20	--	--	--	--	10	--	--	--
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)											
MAY , 1980 08...	--	0	19	--	--	--	--	70	--	--	--

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

DATE	MANGANESE, DISSOLVED (UG/L AS MN)	MERCURY TOTAL RECOVERABLE (UG/L AS HG)	MERCURY DISSOLVED (UG/L AS HG)	NICKEL, DISSOLVED (UG/L AS NI)	SELENIUM, DISSOLVED (UG/L AS SE)	SILVER, DISSOLVED (UG/L AS AG)	STRONTIUM, DISSOLVED (UG/L AS SR)	VANADIUM, DISSOLVED (UG/L AS V)	ZINC, TOTAL RECOVERABLE (UG/L AS ZN)	ZINC, DISSOLVED (UG/L AS ZN)	CYANIDE TOTAL (MG/L AS CN)
415330084545801 - MARBLE LAKE AT BENNETT RD BRIDGE (LAT 41 53 30 LONG 084 54 58)											
SEP , 1980 29...	--	<.1	--	--	--	--	--	--	20	--	--
415402084542601 - MARBLE LAKE (3'BELOW SURFACE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	--	<.1	--	--	--	--	--	--	10	--	--
415402084542602 - MARBLE LAKE (DEEP SITE) (LAT 41 54 02 LONG 084 54 26)											
SEP , 1980 30...	--	.1	--	--	--	--	--	--	20	--	--
444612086061801 - LAKE MICHIGAN 1 MILE WEST OF ESCH ROAD MICHIGAN (LAT 44 46 12 LONG 086 06 18)											
MAY , 1980 15...	0	--	.1	0	1	0	120	1.0	--	0	.00
445007086034001 - NORTH BAR LAKE NR EMPIRE, MICHIGAN (LAT 44 50 07 LONG 086 03 40)											
MAY , 1980 13...	1	--	<.1	--	0	0	--	--	--	10	.00
445512085530801 - SCHOOL LAKE NR GLEN ARBOR, MICHIGAN (LAT 44 55 12 LONG 085 53 08)											
MAY , 1980 14...	2	--	<.1	--	0	0	--	--	--	10	.00
463038086330301 - LAKE SUPERIOR NR MUNISING MI (LAT 46 30 38 LONG 086 33 03)											
JUL , 1980 17...	0	--	.1	0	0	0	20	.0	--	20	.00
463145086270501 - CHAPEL L NR MELSTRAND MI (LAT 46 31 45 LONG 086 27 05)											
MAY , 1980 07...	6	--	<.1	--	0	0	--	--	--	1	.01
463400086202001 - BEAVER L NR MELSTRAND MI (LAT 46 34 00 LONG 086 20 20)											
MAY , 1980 09...	30	--	<.1	--	0	0	--	--	--	10	.00
463503086132501 - KINGSTON L NR GRAND MARAIS MI (LAT 46 35 03 LONG 086 13 25)											
NOV , 1979 27...	--	--	--	--	--	--	--	--	--	--	--
MAY , 1980 08...	1	--	<.1	--	0	0	--	--	--	7	.00
463813086023001 - GRAND SABLE L NR GRAND MARAIS MI (LAT 46 38 13 LONG 086 02 30)											
MAY , 1980 08...	5	--	<.1	--	0	0	--	--	--	0	.00

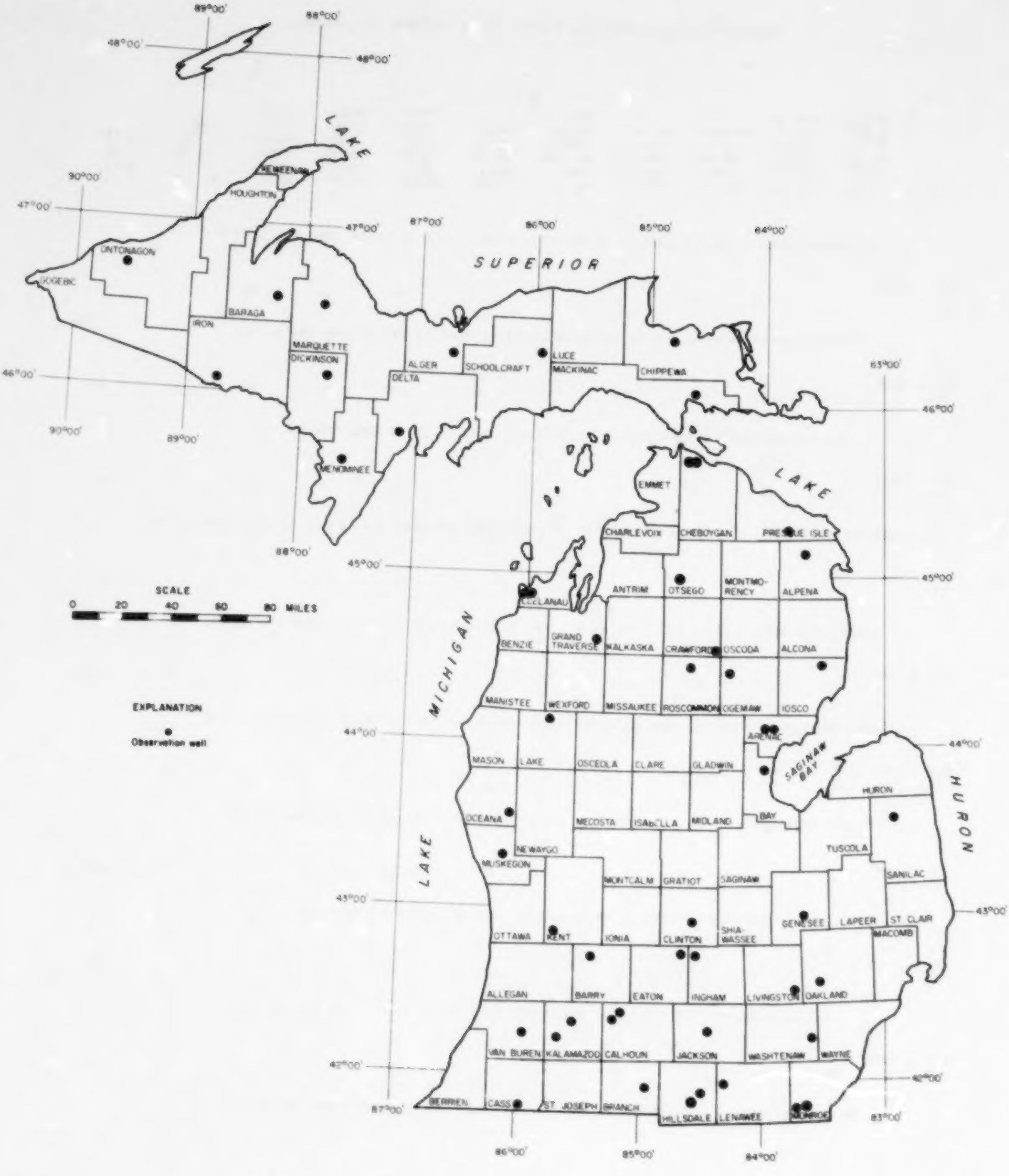
89°00'
88°00'
48°00'
48°00'
LAKE
SUPERIOR
90°00'
47°00'
47°00'
87°00'
86°00'
85°00'
84°00'
KEWEENAW
HOUGHTON
ONTONAGON
GOGEBIC
BARAGA
IRON
MARQUETTE
DICKINSON
ALGER
DELTA
SCHOOLCRAFT
LUCE
MACKINAC
CHIPPEWA
MENOMINEE
46°00'
46°00'
90°00'
89°00'
88°00'
83°00'
LAKE
HURON
EMMET
CHARLEVOIX
CHEBOYGAN
PRESQUE ISLE
45°00'
45°00'
LEELANAU
ANTRIM
OTSEGO
MONTMORENCY
ALPENA
BENZIE
GRAND TRAVERSE
KALKASKA
CRAWFORD
OSCODA
ALCONA
MANISTEE
WEXFORD
MISSAUKEE
ROSCOMMON
OGEMAW
IOSCO
44°00'
44°00'
ARENAC
MASON
LAKE
OSCEOLA
CLARE
GLADWIN
SAGINAW BAY
HURON
OCEANA
MECOSTA
ISABELLA
MIDLAND
BAY
NEWAYGO
MUSKEGON
TUSCOLA
MONTCALM
GRATIOT
SAGINAW
SANILAC
43°00'
43°00'
OTTAWA
KENT
IONIA
CLINTON
SHIAWASSEE
GENESEE
LAPEER
ST CLAIR
MACOMB
ALLEGAN
BARRY
EATON
INGHAM
LIVINGSTON
OAKLAND
VAN BUREN
KALAMAZOO
CALHOUN
JACKSON
WASHTENAW
WAYNE
42°00'
42°00'
BERRIEN
CASS
ST JOSEPH
BRANCH
HILLSDALE
LENAWEE
MONROE
87°00'
86°00'
85°00'
84°00'
83°00'
LAKE
MICHIGAN
SCALE
0
20
40
60
80 MILES
EXPLANATION
●
Observation well

FIGURE 9.--Map showing location of observation wells published in this report.

ALGER COUNTY

461608086373801. Local number, 45N 19W 25BDDB.
LOCATION.--Lat 46°16'08", long 086°37'38", Hydrologic Unit 04060106, 250 ft (76 m) northwest of highway M-44, 0.2 mi (0.3 km) northeast of Kentucky.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 66 ft (20 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of casing, 3.60 ft (1.10 m) above land-surface datum.
PERIOD OF RECORD.--June 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.35 ft (1.94 m) below land-surface datum, June 29, 1960; lowest measured, 14.19 ft (4.33 m) Apr. 3, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 10	9.54	JAN 15	9.84	APR 17	9.94	JUL 2	10.71

ALPENA COUNTY

450850083393401. Local number, 32N 6E 23DDDA.
LOCATION.--Lat 45°08'50", long 083°39'34", Hydrologic Unit 04070006, on Graham Road, 3 mi (5 km) east and 1.5 mi (2.4 km) north of Long Rapids.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table observation well, diameter 6 in (15 cm), depth 88 ft (27 m), screened 79 to 88 ft (24 to 27 m).
DATUM.--Altitude of land-surface datum is 713 ft (217 m). Measuring point: Plywood instrument shelf, 217 ft (0.8 m) above land-surface.
REMARKS.--Bottom of hole near top of bedrock.
PERIOD OF RECORD.--November 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.75 ft (4.80 m) below land-surface datum, May 8, 1979; lowest, 28.73 ft (8.76 m) Mar. 10, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.46	23.41	23.82	--	25.02	26.28	26.02	19.51	19.96	20.06	21.68	23.33
10	22.69	23.62	24.10	--	25.19	26.44	25.19	19.81	19.95	20.10	21.77	23.60
15	22.87	23.83	24.15	--	25.45	26.69	23.16	20.09	19.93	20.40	22.08	23.84
20	22.98	24.04	24.38	24.79	25.71	26.76	21.36	19.80	19.85	20.66	22.39	23.84
25	23.16	24.01	--	24.58	25.94	26.43	19.91	19.83	19.85	20.93	22.83	23.99
EOM	23.21	23.85	--	24.82	26.13	26.21	19.32	19.93	19.93	21.17	23.13	24.21

WTR YEAR 1980 MAX 19.19 APR 29, 1980 MIN 26.78 MAR 18, 19, 1980

ARENAC COUNTY

440342083542801. Local number, 19N 5E 7DABA1.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 185 ft (56 m), screened 180 to 185 ft (55 to 56 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.00 ft (0.61 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.28 ft (2.52 m) below land-surface datum, July 15, 1980; lowest measured, 10.08 ft (3.07 m) Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 4	9.60	JUL 15	8.28	AUG 20	9.88	AUG 21	10.08

ARENAC COUNTY

440342083542802. Local number, 19N 5E 7DABA2.
LOCATION.--Lat 44°03'42", long 083°54'28", Hydrologic Unit 04080101, 3 mi (5 km) northeast of Omer.
Owner: U.S. Geological Survey
AQUIFER.--Lake bed sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 21 ft (6 m), screened 16 to 21 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 667 ft (203 m). Measuring point: Top of casing, 2.2 ft (0.67 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.05 ft (1.54 m) below land-surface datum, June 6, 1980; lowest measured, 6.92 ft (2.11 m) Aug. 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 6	5.05	JUL 15	5.81	AUG 20	6.87	AUG 21	6.92

BARAGA COUNTY

463353088144301. Local number, 48N 32W 12DDCC.
LOCATION.--Lat 46°33'53", long 088°14'43", Hydrologic Unit 04030107, 95 ft (29 m) north of U.S. Highway 41 and 0.5 mi (0.8 km) southeast of Nestoria Road.
Owner: Michigan State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 10 ft (3 m), screened 7 to 10 ft (2 to 3 m).
DATUM.--Altitude of land-surface datum is 1,630 ft (497 m). Measuring point: Top of casing, 4.78 ft (1.46 m) above land-surface datum.
REMARKS.--Measurements made by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.27 ft (1.00 m) below land-surface datum, Apr. 30, 1965; lowest measured, 8.09 ft (2.47 m) Sept. 2, 1960.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 30	6.58	JAN 31	6.99	MAR 31	6.90	MAY 31	5.94	JUL 31	6.46	SEP 30	6.13
DEC 31	6.86	FEB 29	7.11	APR 30	6.21	JUN 30	6.67	AUG 31	6.84		

BARRY COUNTY

424540085232O. Local number, 4N 9W 5DAAA.
LOCATION.--Lat 42°45'40", long 085°23'20", Hydrologic Unit 04050007, on Solomon Road 4 mi (6 km) east and 3.5 mi (5.6 km) north of Middleville.
Owner: State Department of Natural Resources.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 2 in (5 cm), depth 131 ft (40 m).
DATUM.--Altitude of land-surface datum is 860 ft (262 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--December 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 111.5 ft (34.0 m) below land-surface datum, Mar. 20, 1978; lowest measured, 122.0 ft (37.2 m) Mar. 5, 1965.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 8	113.4	MAY 8	116.9	AUG 18	116.8

BAY COUNTY

435128083582401. Local number, 17N 4E 22DCAA.
LOCATION.--Lat 43°51'28", long 083°58'24", Hydrologic Unit 04080102, at end of Second Street, Pinconning.
Owner: Pinconning Township.
AQUIFER.--Saginaw Formation of Pennsylvaina age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 110 ft (33 m), cased to 60 ft (18 m), open end.
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood shelter base, 2.00 ft (0.61 m) above land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--August 1962 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.05 ft (0.02 m) below land-surface datum, Mar. 5, 1976; lowest, 10.53 ft (3.21 m) Aug. 8, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 18	3.49	FEB 28	2.23	JUN 10	2.47	JUL 15	3.41	AUG 21	3.79	SEP 19	3.14
JAN 24	2.21										

BRANCH COUNTY

415602084593701. Local number, 6S 6W 22CABA.
LOCATION.--Lat 41°56'02", long 084°59'37", Hydrologic Unit 04050001, at Bennett and Tibbits Streets, Coldwater.
Owner: City of Coldwater.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 113 ft (34 m), screened 73 to 113 ft (22 to 34 m).
DATUM.--Altitude of land-surface datum is 970 ft (296 m). Measuring point: Plywood shelter base, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping.
PERIOD OF RECORD.--January 1964 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.0 ft (2.7 m) below land-surface datum, May 6, 1975; lowest, 25.9 ft (7.9 m) May 25, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.4	--	22.7	--	18.1	--	--	--	--	15.0	16.6	18.1
10	23.3	--	22.4	--	21.7	--	--	--	--	16.7	12.7	19.5
15	23.2	22.9	22.4	21.0	22.2	--	--	12.6	--	21.9	21.0	16.0
20	14.6	23.5	22.6	20.7	23.0	--	--	--	--	13.1	20.6	12.0
25	22.0	21.7	22.0	21.4	--	16.9	--	--	14.5	22.0	20.7	19.4
EOM	22.9	19.1	21.5	20.2	--	--	--	--	17.2	21.9	18.1	19.7

WTR YEAR 1980 MAX 10.2 JUL 28, 1980 MIN 23.8 OCT 22, 1979

CALHOUN COUNTY

422422085071501. Local number, 1S 7W 10BBAB.
LOCATION.--Lat 42°24'22", long 085°07'15", Hydrologic Unit 04050003, at highways M-78 and M-66, 5 mi (8 km) north of Battle Creek.
Owner: Rilla Sabin.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 15 in (38 cm), depth 12 ft (4 m), open tile bottom.
DATUM.--Land-surface datum is 907.99 ft (276.76 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1946 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 0.89 ft (0.27 m) below land-surface datum, Mar. 28, 1950; lowest, dry, July 29, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 3	4.07	DEC 5	4.00	JAN 30	3.88	APR 16	3.52	JUN 11	3.36	AUG 6	3.71
10	3.82	12	4.50	FEB 6	3.95	23	3.46	18	3.34	13	3.56
17	3.90	19	4.72	MAR 5	3.92	30	3.42	25	3.40	20	3.30
24	4.02	26	4.68	12	3.69	MAY 7	3.42	JUL 2	3.44	27	3.32
30	4.14	JAN 2	3.82	19	3.54	14	3.40	9	3.42	SEP 3	3.29
NOV 7	4.10	9	3.80	26	3.57	21	3.36	16	3.50	10	3.26
14	3.92	16	3.76	APR 2	3.54	28	3.40	23	3.70	17	3.28
21	3.88	23	3.82	9	3.52	JUN 4	3.42	30	3.74	24	3.30
28	3.82										

CALHOUN COUNTY

422025085084001. Local number, 1S 7W 32DABA.
LOCATION.--Lat 42°20'25", long 085°08'40", Hydrologic Unit 04050003, at Verona well field, Battle Creek.
Owner: City of Battle Creek.
AQUIFER.--Marshall Formation of Mississippian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 127 ft (39 m), cased to 103 ft (31 m).
DATUM.--Land-surface datum is 830.79 ft (253.22 m) National Geodetic Vertical Datum of 1929. Measuring point: Recorder base, 2.10 ft (0.64 m) above land-surface datum.
REMARKS.--Water levels affected by nearby municipal pumping. Measurements made daily by Water Department.
PERIOD OF RECORD.--October 1939 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 0.7 ft (0.2 m) below land surface datum, Apr. 26-27, 1950; lowest, 16.75 ft (5.11 m) July 16, 1959.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	8.70	8.20	6.80	7.40	6.40	7.00	6.80	7.70	8.05	7.20	8.05	7.50
10	8.30	8.20	7.80	7.60	7.20	7.90	7.95	7.70	7.20	8.10	7.40	7.60
15	8.50	7.80	7.00	7.30	6.86	6.90	6.20	8.50	7.20	8.90	8.20	7.00
20	8.00	7.10	7.15	6.30	6.90	7.20	7.20	7.10	7.25	7.80	8.12	7.40
25	8.20	6.70	6.70	6.30	7.55	7.30	6.70	7.60	7.90	9.90	7.20	7.65
EOM	7.65	7.25	8.25	6.75	7.50	7.00	7.70	7.10	7.45	8.35	7.50	8.05

CASS COUNTY

414651085575601. Local number, 8S 14W 17BAAA.
LOCATION.--Lat 41°46'51", long 085°57'56", Hydrologic Unit 04050001, 2 mi (3 km) east of Adamsville on U.S. Highway 112.
Owner: Ted Little.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Dug water-table well, diameter 28 in (71 cm), depth 55 ft (17 m), cribbed with brick to open bottom.
DATUM.--Altitude of land-surface datum is 840 ft (256 m). Measuring point: Top of wooden platform, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Measured by observer.
PERIOD OF RECORD.--September 1945 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 46.20 ft (14.08 m) below land-surface datum, July 16, 1950; lowest, dry, Mar. 10, 1947.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	50.30	DEC 22	50.75	FEB 23	50.60	APR 24	50.70	JUN 24	51.10	AUG 22	50.90
NOV 24	50.80	JAN 21	50.95	MAR 25	50.45	MAY 24	50.90	JUL 25	51.40	SEP 24	51.05

CHEBOYGAN COUNTY

454427084424001. Local number, 39N 3W 29CBCB1.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, on Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey
AQUIFER.--Dundee Formation of Devonian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 121 ft (37 m) cased to 104 ft (32 m), open end.
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.25 ft (1.60 m) below land-surface datum, May 12, 1979; lowest measured, 10.77 ft (3.28 m) Sep. 15, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 29	8.10	JAN 15	7.29	JUN 19	7.34	JUL 9	8.21	AUG 13	9.98	SEP 15	10.79
NOV 27	7.54	MAR 13	8.12								

CHEBOYGAN COUNTY

454427084424002. Local number, 39N 3W 29CBCB2.
LOCATION.--Lat 45°44'27", long 084°42'40", Hydrologic Unit 04070003, On Stimpson Rd. 3 mi (5 km) southeast of Mackinaw City.
Owner: U.S. Geological Survey.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 55 ft (17 m), screened 40 to 55 ft (12 to 17 m).
DATUM.--Altitude of land-surface datum is 705 ft (215 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--February 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 2.07 ft (0.63 m) below land-surface datum, May 12, 1979; lowest measured, 5.64 ft (1.72 m) Sep. 15, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 29	3.19	JAN 15	3.04	JUN 19	2.96	JUL 9	3.87	AUG 13	5.08	SEP 15	5.64
NOV 27	3.13	MAR 13	3.84								

CHIPPEWA COUNTY

462159084442201. Local number, 46N 4W 24DADA.
LOCATION.--Lat 46°21'59", long 084°44'22", Hydrologic Unit 04020203, on trail 0.2 mi (0.3 km) south of highway M-28 and 1 mi (2 km) west of Raco.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 54 ft (16 m).
DATUM.--Altitude of land-surface datum is 850 ft (259 m). Measuring point: Top of shelter base, 3.07 ft (0.94 m) above land-surface datum.
PERIOD OF RECORD.--June 1952 to April 1965. November 1969 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 18.40 ft (5.61 m) below land-surface datum, June 7, 1971; lowest, 28.43 ft (8.67 m) Apr. 14, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	21.20	21.36	20.92	21.00	21.35	21.75	22.18	20.77	--	21.32	21.87	22.43
10	21.25	21.36	20.93	20.92	21.40	21.83	22.09	20.69	21.17	21.41	21.90	22.49
15	--	21.36	20.89	21.13	21.45	21.90	21.58	20.77	21.22	21.51	22.02	22.58
20	--	21.35	20.84	21.26	21.54	21.95	21.26	20.77	21.18	21.59	22.12	22.66
25	21.63	21.35	20.87	21.17	21.60	22.02	20.99	20.88	21.18	21.67	22.25	22.75
EOM	21.39	21.22	20.92	21.24	21.69	22.10	20.88	21.04	21.26	21.77	22.40	22.84

WTR YEAR 1980 MAX 20.62 MAY 11, 1980 MIN 22.84 SEP 30, 1980

CLINTON COUNTY

425410084323501. Local number, 6N 2W 16DDAD.
LOCATION.--Lat 42°54'10", long 084°32'35", Hydrologic Unit 04050005, at U.S. Highway 27, 6 mi (10 km) south of St. Johns.
Owner: State Highway Department.
AQUIFER.--Gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven observation water-table well, diameter 2 in (51 cm), depth 26 ft (8 m), screened 23 to 26 ft (7 to 8 m).
DATUM.--Land-surface datum is 803.32 ft (244.85 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 1.30 ft (0.40 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--August 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.84 ft (4.22 m) below land-surface datum, Apr. 30, 1974; lowest measured, 19.93 ft (6.07 m) Feb. 27, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 22	18.83	DEC 21	19.04	FEB 21	18.82	APR 24	18.11	JUN 24	17.91	AUG 21	18.65
NOV 27	19.00	JAN 21	18.71	MAR 24	18.72	MAY 27	17.93	JUL 23	18.51	SEP 23	18.77

CRAWFORD COUNTY

443308084245001. Local number, 25N 1W 15DDCD.
LOCATION.--Lat 44°33'08", long 084°24'50", Hydrologic Unit 04070007, 2.6 mi (4.2 km) south of Eldorado on Highway M-18.
Owner: U.S. Forest Service.
AQUIFER.--Glacial deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 56 ft (17 m), cased.
DATUM.--Altitude of land-surface datum is 1,190 ft (363 m). Measuring point: Top of shelter base, 2.95 ft (0.90 m) above land-surface datum.
PERIOD OF RECORD.--November 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 25.71 ft (7.84 m) below land-surface datum, May 10, 1976; lowest, 35.97 ft (10.96 m) Apr. 4-6, 1951.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	30.33	29.81	30.06	--	30.71	30.92	31.09	31.04	30.64	30.43	30.38	30.49
10	30.33	29.82	30.16	--	30.73	30.94	31.10	30.98	30.57	30.42	30.38	30.50
15	30.33	29.87	30.23	--	30.77	31.02	31.08	30.91	30.53	30.41	30.41	30.55
20	29.60	29.94	30.25	30.58	30.80	31.05	31.14	30.82	30.49	30.39	--	30.63
25	29.69	29.95	30.32	30.62	30.86	31.06	31.12	30.76	30.47	30.38	30.46	30.67
EOM	29.75	29.92	30.37	30.67	30.92	31.06	31.09	30.67	30.44	30.38	30.47	30.69

WTR YEAR 1980 MAX 29.20 JAN 1, 2, 1980 MIN 31.16 APR 16, 17, 18, 1980

DELTA COUNTY

454446087090401. Local number, 39N 23W 28ACC.
LOCATION.--Lat 45°44'46", long 087°09'04", Hydrologic Unit 04030111, 3.5 mi (5.6 km) east of Escanaba.
Owner: M. Blake
AQUIFER.--Munising Sandstone of Cambrian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 5 in (13 cm), depth 530 ft (162 m).
DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of shelter base, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--July 1968 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 1.5 ft (0.5 m) below land-surface datum, May 6, 1960; lowest, 8.9 ft (2.7 m) Feb. 6, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	6.64	6.29	5.92	6.02	5.93	6.26	5.89	5.54	--	6.28	6.36	--
10	6.71	6.08	5.92	6.01	6.00	6.31	5.56	5.55	--	6.10	6.05	--
15	6.70	6.12	6.02	5.95	6.02	6.50	5.46	5.55	--	6.25	6.09	--
20	6.64	6.10	6.09	5.68	6.04	6.31	5.50	5.57	--	6.32	6.16	--
25	6.45	6.00	5.86	5.63	6.06	6.15	5.48	5.71	--	6.34	--	5.84
EOM	6.40	5.85	5.93	5.86	6.31	6.01	5.50	5.86	--	6.42	--	5.88

WTR YEAR 1980 MAX 5.32 MAY 12, 1980 MIN 6.82 OCT 18, 1979

DICKINSON COUNTY

460458087493901. Local number, 43N 28W 32ADAB.
LOCATION.--Lat 46°04'58", long 087°49'39", Hydrologic Unit 04030109, 6.25 mi (10.06 km) north of Felch.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter, 1¼ in (3.18 cm), depth 31 ft (9 m) screened 29 to 31 ft (8.8 to 9.4 m).
DATUM.--Altitude of land-surface datum is 1,160 ft (353 m). Measuring point: Hole in top of cap, 4.00 ft (1 m) above land-surface datum.
PERIOD OF RECORD.--October 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 13.10 ft (3.99 m) below land-surface datum, May 17, 1972; lowest measured, 16.50 ft (5.03 m) Mar. 2, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 7	14.01	JAN 3	14.52	FEB 19	14.88	SEP 24	14.53

EATON COUNTY

424435084365001. Local number, 4N 3W 12CDAD.
LOCATION.--Lat 42°44'35", long 084°36'50", Hydrologic Unit 04050004, north of M-43, 0.5 mi (0.8 km) west of Lansing.
Owner: F. Wheeler.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 381 ft (116 m), cased to 140 ft (43 m).
DATUM.--Land-surface datum is 862.91 ft (263.01 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood instrument shelf, 1.00 ft (0.30 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--October 1953 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 67.5 ft (20.6 m) below land-surface datum, Nov. 23, 1953; lowest,,103.6 ft (31.6 m) Aug. 28, 1969.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	92.8	91.2	85.6	--	--	91.11	89.41	91.67	93.06	99.18	95.98	89.76
10	91.7	90.1	89.9	--	--	90.91	88.94	89.29	92.05	95.63	96.29	89.20
15	92.5	92.1	91.1	--	--	92.38	89.86	87.02	91.03	98.93	96.80	87.82
20	92.1	92.1	91.9	--	--	93.84	92.42	86.20	93.61	97.06	96.28	88.90
25	92.8	85.4	91.7	--	--	92.73	92.18	91.69	95.52	97.54	92.98	89.24
EOM	91.2	83.8	91.7	--	91.46	94.42	94.76	95.27	--	95.89	92.05	88.37

WTR YEAR 1980 MAX 82.7 DEC 3, 1979 MIN 100.06 JUL 17, 1980

GENESEE COUNTY

425552083382801. Local number, 6N 7E 9DCCC.
LOCATION.--Lat 42°55'52", long 083°38'28", Hydrologic Unit 04080204, at Fisher Body Plant, Grand Blanc.
Owner: General Motors Corporation.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 10 in (25 cm), depth 385 ft (117 m), cased to 150 ft (46 m).
DATUM.--Land-surface datum is 837.0 ft (255.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Base for recorder, 1.50 ft (0.46 m) above land-surface datum.
REMARKS.--Water levels affected by nearby pumping. Measurements made by Plant Water Department.
PERIOD OF RECORD.--January 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 52.3 ft (15.9 m) below land-surface datum, Dec. 29, 1975; lowest, 87.0 ft (26.5 m) Jun. 29, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	68.9	63.6	62.6	63.3	64.8	62.3	64.9	61.0	64.4	78.8	64.2	67.9
10	66.1	62.7	61.8	66.6	64.8	61.0	66.4	62.2	62.5	67.2	62.8	70.9
15	63.9	62.4	63.2	63.6	62.6	61.6	65.4	62.5	62.3	67.5	62.2	66.4
20	63.4	63.4	64.2	63.5	62.2	63.7	64.7	63.3	63.6	66.9	64.8	63.6
25	63.2	63.6	61.7	62.6	61.6	65.3	63.7	65.7	68.2	68.5	63.7	63.2
EOM	64.9	63.0	60.7	64.3	[illegible]	65.9	61.8	66.9	70.1	66.3	66.7	61.9

WTR YEAR 1980 MAX 60.2 MAR 10, 1980 MIN 78.[illegible] [illegible] 4, 5, 1980

GRAND [illegible]VERSE COUNTY

443921085213501. Local number, 26N 9W 14ABAA.
LOCATION.--Lat 44°39'21", long 085°21'35", Hydrologic Unit 04060105, 5.5 mi (8.8 km) north of Fife Lake.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 80 ft (24 m), PVC pipe and screen.
DATUM.--Altitude of land-surface datum is 960 ft (293 m). Measuring point: Plywood instrument shelf, 2.85 ft (0.87 m) above land-surface datum.
PERIOD OF RECORD.--June 1976 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 23.32 ft (7.11 m) below land-surface datum, June 17, 1976; lowest, 26.86 ft (8.19 m), Feb. 16, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.65	26.01	26.28	26.36	26.36	26.45	26.59	26.04	25.54	25.66	25.82	26.03
10	25.71	26.06	26.31	26.37	26.35	[illegible]	26.60	25.91	25.54	25.67	25.85	26.07
15	25.78	26.11	26.33	26.38	26.37	26.50	26.57	25.78	25.56	25.70	25.88	26.11
20	25.83	26.16	26.34	26.38	26.38	26.52	26.46	25.68	25.58	25.72	25.91	26.16
25	25.89	26.20	26.34	26.38	26.42	26.55	26.31	25.61	25.60	25.76	25.94	26.20
EOM	25.95	26.25	26.35	26.36	26.44	26.57	26.17	25.56	25.63	25.79	25.98	26.24

WTR YEAR 1980 MAX 25.53 JUN 6-10, 1980 MIN 26.60 APR 7, 10-13, 1980

HILLSDALE COUNTY

415154084315401. Local number, 7S 2W 15BCBA1.
LOCATION.--Lat 41°51'54", long 084°31'54", Hydrologic Unit 04100003, at Trail and Bird Lake Roads 7 mi (11 km) southeast of Hillsdale.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 150 ft (46 m), screened 135 to 150 ft (41 to 46 m).
DATUM.--Altitude of land-surface datum is 1092 ft (333 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--November 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 47.94 ft (14.61 m) below land-surface datum, Sep. 4, 1979; lowest measured, 49.00 ft (14.93 m) Mar. 15, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	48.79	DEC 10	48.97	FEB 22	48.62	MAY 14	48.13	JUL 30	48.07	SEP 2	48.10
NOV 13	49.02	JAN 15	48.93	MAR 28	48.73	JUN 25	47.98				

HILLSDALE COUNTY

415236084313701. Local number, 7S 2W 10BDDD.
LOCATION.--Lat 41°52'36", long 084°31'37", Hydrologic Unit 04100003, 2.5 mi (4.0 km) west of Pittsford on M-43.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Augered water-table well, diameter 1¼ in (3.2 cm), depth 20 ft (6 m), screened 17 to 20 ft (5 to 6 m).
DATUM.--Altitude of land-surface datum is 1,070 ft (326 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.
PERIOD OF RECORD.--December 1965 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 6.98 ft (2.13 m) below land-surface datum, May 22, 1978; lowest measured, 11.1 ft (3.38 m), Sept. 21, 1967.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 4	8.94	DEC 10	8.15	FEB 22	8.59	MAY 14	7.50	JUL 30	8.21	SEP 3	7.40
NOV 13	8.83	JAN 15	8.01	MAR 28	7.93	JUN 25	7.62				

INGHAM COUNTY

424502084331301. Local number, 4N 2W 9BDAD.
LOCATION.--Lat 42°45'02", long 084°33'13", Hydrologic Unit 04050004, at North Grand River Avenue and Josephine Streets, Lansing.
Owner: City of Lansing.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 14 in (36 cm), depth 395 ft (120 m), cased to 49 ft (15 m).
DATUM.--Land-surface datum is 828.81 ft (252.62 m) National Geodetic Vertical Datum of 1929. Measuring point: Plywood shelter base, 9.4 ft (2.9 m) below land-surface datum.
REMARKS.--Water levels affected by regional pumping.
PERIOD OF RECORD.--December 1929 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 15.63 ft (4.76 m) below land-surface datum, Mar. 26, 1931; lowest, 179.4 ft (54.7 m) Apr. 29, 1968.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	118.0	104.3	98.6	97.3	94.8	--	93.7	93.0	--	--	--	--
10	114.6	102.9	98.5	99.6	94.5	--	94.2	92.4	--	--	--	--
15	111.3	102.0	98.2	99.0	95.1	--	95.0	91.6	--	--	--	--
20	109.1	102.0	97.6	97.5	95.5	--	--	90.9	--	--	--	--
25	107.1	100.9	96.5	95.7	96.1	--	96.5	90.6	--	--	--	--
EOM	105.3	99.7	95.9	95.4	95.8	95.0	94.2	91.4	--	--	--	--

WTR YEAR 1980 MAX 89.3 MAY 24, 1980 MIN 120.2 OCT 1, 1979

IOSCO COUNTY

442839083312301. Local number, 24N 7E 13ADAD1.
LOCATION.--Lat 44°28'39", long 083°31'23", Hydrologic Unit 04070007, 10 mi (16 km) west of Oscoda.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 69 ft (21 m), screened 54 to 69 ft (16 to 21 m).
DATUM.--Altitude of land-surface datum is 760 ft (232 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--June 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 29.67 ft (9.04 m) below land-surface datum,July 14, 1980; lowest measured, 29.98 ft (9.14 m) Sep. 10, 1980

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JUN 27	29.73	JUL 14	29.67	AUG 20	29.76	SEP 10	29.98

IRON COUNTY

460455088412901. Local number, 43N 35W 33BDAD.
LOCATION.--Lat 46°04'55", long 088°41'29", Hydrologic Unit 04030106, 1.3 mi (2.1 km) south of junction U.S. 2 on highway M-73.
Owner: State Highway Department.
AQUIFER.--Sand and gravel of Pleistocene age.
WELL CHARACTERISTICS.--Driven water-table well, diameter 1¼ in (3.2 cm), depth 12 ft (4 m), screened 9 to 12 ft (3 to 4 m).
DATUM.--Altitude of land-surface datum is 1,520 ft (463 m). Measuring point: Top of casing, 2.05 ft (0.62 m) above land-surface datum.
REMARKS.--Measured by Wisconsin-Michigan Power Company.
PERIOD OF RECORD.--September 1948 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 1.66 ft (0.51 m) below land-surface datum, June 1, 1973; lowest measured, 8.44 ft (2.57 m) Mar. 15, 1949.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 30	3.43	JAN 31	4.15	MAR 31	4.04	MAY 31	3.88	JUL 31	4.54	SEP 30	3.76
DEC 31	3.86	FEB 29	4.49	APR 30	3.70	JUN 30	4.25	AUG 31	4.62		

JACKSON COUNTY

421435084234801. Local number, 3S 1W 2BDBA.
LOCATION.--Lat 42°14'35", long 084°23'48", Hydrologic Unit 04050004, at end of Hamburg Street, Jackson.
Owner: City of Jackson.
AQUIFER.--Saginaw Formation of Pennsylvanian age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 12 in (30 cm), depth 400 ft (122 m), open bottom.
DATUM.--Altitude of land-surface datum is 935 ft (285 m). Measuring point: Plywood recorder shelf, +4.00 ft (1.22 m) above land-surface datum.
REMARKS.--Water levels affected by pumping.
PERIOD OF RECORD.--August 1966 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 16.3 ft (5.9 m) below land-surface datum, Jan. 3, 1971; lowest, 68.8 ft (21.0 m) Jun. 30, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	41.9	35.1	37.6	--	--	37.9	28.8	30.1	36.3	28.0	37.8	38.1
10	39.4	37.8	34.4	--	--	34.7	34.6	33.3	33.4	31.7	33.7	38.0
15	37.4	39.0	40.2	--	--	37.4	32.4	35.4	29.7	35.7	38.2	32.4
20	39.8	37.9	--	36.2	35.2	36.6	26.9	33.6	36.2	33.1	37.1	34.8
25	40.2	27.2	--	--	33.6	34.7	34.5	29.4	36.5	39.7	36.8	35.8
EOM	37.6	38.4	--	--	36.3	30.9	33.4	34.8	36.3	40.0	33.0	33.6

WTR YEAR 1980 MAX 22.4 JAN 1, 1980 MIN 42.8 OCT 4, 1980

KALAMAZOO COUNTY

421641085350601. Local number, 2S 11W 22CDBB.

LOCATION.--Lat 42°16'41", long 085°35'06", Hydrologic Unit 04050003, at southwest corner Corsstown Parkway and Stockbridge Avenue, Kalamazoo.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 137 ft (42 m), screened 134 to 137 ft (41 to 42 m).

DATUM.--Land-surface datum is 764.7 ft (233.1 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.00 ft (0.61 m) above land surface datum.

REMARKS.--Water levels affected by nearby pumping.

PERIOD OF RECORD.--August 1960 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.81 ft (1.47 m) below land-surface datum, Feb. 5, 1975; lowest, 31.08 ft (9.47 m) Aug. 19, 1961.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	9.28	9.21	8.85	8.36	8.12	8.00	7.81	7.69	7.72	7.80	7.99	8.14
10	9.29	9.18	8.78	8.30	8.10	7.96	7.76	7.70	7.73	7.82	8.01	8.17
15	9.27	9.12	8.70	8.24	8.09	7.95	7.70	7.68	7.74	7.85	8.03	8.18
20	9.25	9.06	8.65	8.19	8.05	7.91	7.69	7.68	7.73	7.87	8.05	8.19
25	9.25	8.97	8.59	8.17	8.02	7.88	7.70	7.68	7.74	7.90	8.08	8.20
EOM	9.24	8.92	8.45	8.16	8.01	7.85	7.70	7.70	7.77	7.93	8.12	8.20

WTR YEAR 1980 MAX 7.67 MAY 20, 1980 MIN 9.30 OCT 11, 1979

KALAMAZOO COUNTY

421325085404801. Local number, 3S 12W 11BDAD.

LOCATION.--Lat 42°13'25", long 085°40'48", Hydrologic Unit 04050003, at Kalamazoo Community College.

Owner: City of Kalamazoo.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 3 in (7.6 cm), depth 248 ft (76 m).

DATUM.--Altitude of land-surface is 880 ft (268 m). Measuring point: Top of shelter base, 4.0 ft (1.2 m) above land-surface datum.

PERIOD OF RECORD.--March 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, +2.98 ft (+0.91 m) above land-surface datum, Sept. 4, 1969; lowest, 1.04 ft (0.32 m) below land-surface datum, Aug. 4, 1977.

WATER LEVEL, IN FEET ABOVE AND BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	+0.72	+0.70	+0.76	+0.74	+0.69	--	+0.62	+0.79	+0.38	+0.22	-0.01	-0.20
10	+0.71	--	+0.75	+0.72	--	--	+0.66	+0.79	+0.41	+0.11	+0.06	-0.25
15	+0.73	--	+0.71	+0.70	--	--	+0.65	+0.78	+0.39	+0.09	-0.03	-0.26
20	+0.74	--	+0.68	+0.70	--	--	+0.69	+0.95	+0.17	+0.03	-0.08	-0.24
25	+0.70	+0.76	+0.71	+0.66	--	--	+0.68	+0.70	+0.05	-0.11	-0.14	-0.26
EOM	+0.72	+0.75	+0.78	+0.68	--	+0.66	+0.73	+0.74	-0.07	-0.02	-0.19	-0.29

WTR YEAR 1980 MAX +1.11 MAY 3, 1980 MIN -0.29 SEP 22, 23, 30, 1980

KENT COUNTY

425030085434901. Local number, 5N 12W 4DCCD.

LOCATION.--Lat 42°50'30", long 085°43'49", Hydrologic Unit 04050006, 2.1 mi (3.4 km) north of Byron Center and 0.4 mi (0.6 km) west of Byron Center Road.

Owner: City of Wyoming.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 86 ft (26 m).

DATUM.--Land-surface datum is 685.97 ft (209.08 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of shelter base, 2.50 ft (0.76 m) above land-surface datum.

REMARKS.--Monthly measurements begun August 1978.

PERIOD OF RECORD.--October 1962 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 8.28 ft (2.52 m) below land-surface datum, Apr. 14, 1974; lowest, 12.91 ft (3.93 m) Aug. 19, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 24	10.94	JAN 8	10.28	MAR 12	10.48	JUN 18	10.26	AUG 19	10.97	SEP 22	11.02
NOV 28	10.63	FEB 12	10.44	MAY 8	10.18	JUL 24	10.80				

LAKE COUNTY

440737085483701. Local number, 20N 13W 13ACAC1.
LOCATION.--Lat 44°07'37", long 085°48'37", Hydrologic Unit 04060103, 5 mi (8 km) east of Irons.
Owner: U.S. Geological Survey.
AQUIFER.--Outwash deposits of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 57 ft (17 m), screened 42 to 57 ft (13 to 17 m).
DATUM.--Altitude of land-surface datum is 945 ft (288 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--March 1980 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 14.70 ft (4.48 m) below land-surface datum, July 22, 1980; lowest measured, 17.08 ft (5.21 m) Mar. 14, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
MAR 14	17.08	JUL 22	14.70	AUG 28	15.07	SEP 25	15.44

LEELANAU COUNTY

445020086012201. Local number, 28N 14W 8DDCA1.
LOCATION.--Lat 44°50'20", long 086°01'22", Hydrologic Unit 04060104, 2.5 mi (4.0 km) northeast of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 138 ft (42 m), screened 123 to 138 ft (37 to 42 m).
DATUM.--Altitude of land-surface datum is 750 ft (229 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land surface datum.
PERIOD OF RECORD.--February 1978 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 113.12 ft (34.48 m) below land-surface datum, Mar. 21, 1980; lowest measured, 113.50 ft (34.59 m), July 21, 1980.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 25	113.19	MAY 15	113.30	JUN 18	113.18	JUL 21	113.50	AUG 27	113.30	SEP 24	113.36
MAR 21	113.12										

LEELANAU COUNTY

445011086031401. Local number, 28N 14W 18BABB1.
LOCATION.--Lat 44°50'11", long 086°03'14", Hydrologic Unit 04060104, 2 mi (3 km) north of Empire.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 60 ft (18 m), screened 45 to 60 ft (14 to 18 m).
DATUM.--Altitude of land-surface datum is 625 ft (190 m). Measuring point: Top of casing 2.0 ft (0.6 m) above land-surface datum.
PERIOD OF RECORD.--November 1979 to present.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 23.20 ft (7.07 m) below land-surface datum, May 15, 1980; lowest measured, 24.16 ft (7.36 m) Nov. 21, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
NOV 21	24.16	FEB 25	23.63	MAY 15	23.20	JUL 21	23.87	AUG 31	23.87	SEP 23	23.96
DEC 13	23.82	MAR 21	23.61	JUN 18	23.49						

LENAWEE COUNTY

420246084150601. Local number, 5S 1E 12DDBD.

LOCATION.--Lat 42°02'46", long 084°15'06", Hydrologic Unit 04100002, 2 mi (3 km) west of Cambridge Junction on the Onsted State Game Area.
Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 39 ft (12 m), screened 36 to 39 ft (11 to 12 m).

DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Top of casing, 3.00 ft (0.91 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 16.19 ft (4.93 m) below land-surface datum, Apr. 5, 1979; lowest measured, 19.33 ft (5.89 m) Sept. 2, 1971

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	17.75	DEC 13	17.13	FEB 22	16.86	MAY 8	16.76	JUL 23	16.15	AUG 28	17.13
NOV 14	17.39	JAN 16	16.90	MAR 24	16.52	JUN 25	16.92				

LIVINGSTON COUNTY

422853083402801. Local number, 1N 6E 13DRAB.

LOCATION.--Lat 42°28'53", long 083°40'28", Hydrologic Unit 04090005, 2 mi (3 km) northwest of South Lyon on Twelve Mile Road.
Owner: American Aggregate Corporation.

AQUIFER.--Glacial deposits of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 2 in (5 cm), depth 29 ft (9 m), 1¼ in (3.2 cm) diameter screen.

DATUM.--Altitude of land-surface datum is 930 ft (283 m). Measuring point: Plywood instrument shelf, 2.50 ft (0.76 m) above land-surface datum.

PERIOD OF RECORD.--April 1970 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 12.1 ft (3.7 m) below land-surface datum, Apr. 22, 1974; lowest, 21.58 ft (6.58 m) Oct. 30, 31, Nov. 1, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	--	21.32	19.97	19.41	--	18.44	17.81	16.82	--	15.90	16.18	16.20
10	--	20.99	19.79	19.35	--	18.40	17.62	16.65	--	15.96	16.24	16.27
15	--	20.74	19.73	19.27	18.69	18.40	17.39	16.53	--	15.97	16.23	16.30
20	--	20.53	19.66	19.21	18.60	18.11	17.17	16.45	--	16.04	16.28	16.27
25	--	20.31	19.56	19.07	18.55	17.98	17.11	16.42	--	16.09	16.25	16.22
EOM	21.58	20.07	19.48	--	18.50	17.89	17.00	16.44	--	16.16	16.29	16.29

WTR YEAR 1980 MAX 15.85 JUL 1, 2, 3, 1980 MIN 21.58 OCT 30, 31, NOV 1, 1979

MACKINAC COUNTY

460321084354801. Local number, 42N 2W 7AABB.

LOCATION.--Lat 46°03'21", long 084°35'48", Hydrologic Unit 04070002, 2 mi (3 km) north of Pontchartrain Shores at Pontchartrain and St. Ignace Roads.
Owner: U.S. Forest Service.

AQUIFER.--Manistique Dolomite of Silurian age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 6 in (15 cm), depth 102 ft (31 m).

DATUM.--Altitude of land-surface datum is 650 ft (198 m). Measuring point: Top of shelter floor, 2.3 ft (0.7 m) above land-surface datum.

PERIOD OF RECORD.--June 1956 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 13.1 ft (4.0 m) below land-surface datum, May 11, 1960; lowest, 32.3 ft (9.8 m) Feb. 7, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	25.2	22.5	21.2	23.4	24.0	25.7	--	20.8	24.1	25.1	27.0	28.3
10	25.5	22.5	22.3	23.9	24.3	26.1	16.0	21.4	23.9	25.6	27.3	28.6
15	25.8	22.7	22.8	24.2	24.6	26.3	17.4	22.2	24.0	25.8	27.6	28.7
20	25.8	22.9	23.3	21.3	24.9	26.6	18.1	22.6	23.8	26.1	27.8	28.7
25	21.8	22.2	23.0	22.6	25.3	26.4	19.2	23.2	24.2	26.5	28.0	28.8
EOM	21.4	20.0	22.8	23.5	25.6	22.1	20.2	23.7	24.7	26.8	28.1	28.7

WTR YEAR 1980 MAX 16.0 APR 10, 1980 MIN 28.8 SEP 19, 1979

MARQUETTE COUNTY

462938087475901. Local number, 47N 28W 3CCDC.

LOCATION.--Lat 46°29'38", long 087°47'59", Hydrologic Unit 04020105, 4.8 mi (7.7 km) west of Ishpeming on U.S. Highway 41 and M-28.
Owner: Ely Township.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 8 in (20 cm), depth 72 ft (22 m), screened 68 to 72 ft (19 to 22 m).

DATUM.--Land-surface datum is 1,571.99 ft (479.14 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of recorder base, 3.0 ft (0.9 m) above land-surface datum.

REMARKS.--Federal key well.

PERIOD OF RECORD.--August 1961 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 9.74 ft (2.97 m) below land-surface datum, May 13, 1974; lowest, 19.26 ft (5.87 m) Apr. 10-11, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.84	11.94	12.52	--	--	14.50	--	13.21	13.74	14.12	14.47	15.06
10	12.98	11.98	12.74	--	13.93	14.62	--	13.25	13.63	14.19	14.57	15.14
15	13.11	12.19	13.04	--	14.09	--	--	13.41	13.67	14.29	14.68	15.01
20	13.12	12.35	13.13	--	14.20	--	--	13.47	13.77	14.37	14.76	14.79
25	12.58	12.40	--	13.57	14.34	14.90	--	13.58	13.86	14.34	14.88	14.33
EOM	12.16	12.49	--	--	14.44	--	13.20	13.73	13.98	14.35	14.98	14.12

WTR YEAR 1980 MAX 11.84 NOV 9, 1979 MIN 15.16 SEP 12, 1980

MENOMINEE COUNTY

453504087331301. Local number, 37N 26W 19DADA.

LOCATION.--Lat 45°35'04", long 087°33'13", Hydrologic Unit 04030108, on Highway U.S. 41 at Carney.
Owner: State Highway Department.

AQUIFER.--Trenton Limestone and Black River Formation of Middle Ordovician age.

WELL CHARACTERISTICS.--Water-table well, diameter 4 in (10 cm), depth 17 ft (5 m), cased.

DATUM.--Altitude of land-surface datum is 800 ft (244 m). Measuring point: Top of 2 in (5 cm) reducing nipple, 1.26 ft (0.38 m) above land-surface datum.

PERIOD OF RECORD.--September 1959 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.47 ft (1.06 m) below land-surface datum, Apr. 12, 1979; lowest measured, 8.62 ft (2.63 m) Jan. 17, 1977.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 20	4.79	JAN 2	5.13	MAR 17	5.96	JUL 23	5.08

MONROE COUNTY

415206083414401. Local number, 7S 6E 15ACAA.

LOCATION.--Lat 41°52'06", long 083°41'44", Hydrologic Unit 04100002, on Teal Road 2 mi (3 km) southeast of Petersburg.
Owner: U.S. Geological Survey.

AQUIFER.--Detroit River Group of Devonian age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 72 ft (22 m), cased to 53 ft (16 m), open end.

DATUM.--Altitude of land-surface datum is 680 ft (207 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--November 1978 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 35.70 ft (10.88 m) below land-surface datum, Sep. 29, 1979; lowest measured, 40.55 ft (12.36 m) Nov. 2, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	40.17	DEC 13	39.25	FEB 21	38.88	MAY 5	36.15	JUL 17	39.18	SEP 29	35.70
NOV 16	40.24	JAN 16	38.27	MAR 25	37.90	JUN 17	35.82	AUG 25	35.75		

MONROE COUNTY

415235083414001. Local number, 7S 6E 15ADBB.

LOCATION.--Lat 41°52'35", long 083°41'50", Hydrologic Unit 04100002, 1.5 mi (2.4 km) southeast of Petersburg on Teal Road.
Owner: State Department of Natural Resources

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 1¼ in (3.2 cm), depth 17 ft (5 m), screened 14 to 17 ft (4 to 5 m).

DATUM.--Altitude of land-surface datum is 675 ft (206 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.

PERIOD OF RECORD.--December 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 3.00 ft (0.91 m) below land-surface datum, Feb. 14, 1966; lowest measured, 6.69 ft (2.04 m), Dec. 29, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 1	6.12	DEC 13	5.90	FEB 21	6.19	MAY 5	5.14	JUL 17	5.21	SEP 29	4.19
NOV 16	6.40	JAN 16	5.64	MAR 25	5.80	JUN 17	4.67	AUG 25	4.39		

MUSKEGON COUNTY

431806086044401. Local number, 11N 15W 34ADDD.

LOCATION.--Lat 43°18'06", long 086°04'44", Hydrologic Unit 04060102, 8 mi (13 km) northeast of Holton on Holton-Duck Lake Road.
Owner: State Department of Natural Resources.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water table well, diameter 1¼ in (3.2 cm), depth 31 ft (9 m), screened 28 to 31 ft (8.5 to 9 m).

DATUM.--Altitude of land-surface datum is 595 ft (181 m). Measuring point: Top of casing, 4.00 ft (1.22 m) above land-surface datum.

PERIOD OF RECORD.--November 1965 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, +0.16 ft (+0.05 m) above land-surface datum, May 22, 1974; lowest measured, 4.74 ft (1.44 m) below land-surface datum, Sept. 5, 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
JAN 3	0.92	MAY 6	1.07	AUG 12	1.77

OAKLAND COUNTY

424133083293201. Local number, 3N 8E 3DBAB.

LOCATION.--Lat 42°41'33", long 083°29'32", Hydrologic Unit 04090005, 3 mi (5 km) east of White Lake at White Lake and Teggerdine Roads.
Owner: Huron Clinton Metropolitan Park Authority.

AQUIFER.--Sand and gravel of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 163 ft (50 m), screened 143 to 163 ft (44 to 50 m).

DATUM.--Altitude of land-surface datum is 1,000 ft (305 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.

PERIOD OF RECORD.--July 1972 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 7.20 ft (2.19 m) below land-surface datum, May 7, 1976; lowest, 11.16 ft (3.40 m) Sept. 12, 1978.

WATER LEVEL IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	10.51	10.52	10.02	9.84	10.06	10.13	9.04	8.82	9.11	--	9.72	9.99
10	10.51	10.46	10.06	9.95	10.08	10.11	8.98	8.99	8.94	--	9.77	10.11
15	10.50	10.45	10.10	9.83	10.15	10.20	8.78	8.99	9.05	--	9.83	10.03
20	10.46	10.50	10.14	9.83	10.14	9.55	8.78	8.80	9.13	--	9.85	9.94
25	10.50	10.13	9.78	9.92	9.99	9.45	8.83	9.00	9.25	--	9.86	9.93
EOM	10.51	10.04	9.76	10.00	10.08	9.33	8.77	9.10	9.37	9.81	9.95	9.97

WTR YEAR 1980 MAX 8.70 APR 15, 1980 MIN 10.61 OCT 1, 1979

OCEANA COUNTY

433133086082601. Local number, 13N 15W 18AAAA.
LOCATION.--Lat 43°31'33", long 086°08'26", Hydrologic Unit 04060101, approximately 6 mi (10 km) southwest of Hesperia.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water table well, diameter 6 in (15 cm), depth 79 ft (24 m), screened 69 to 79 ft (21 to 24 m).
DATUM.--Altitude of land-surface datum is 703 ft (214 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
REMARKS.--Continuous recorder installed, July 10, 1979.
PERIOD OF RECORD.--August 1977 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 36.10 ft (11.00 m) below land-surface datum, May 25, 1978; lowest measured, 40.37 ft. (12.30 m) Apr. 12, 1978.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	38.06	--	39.00	39.45	39.58	39.71	39.88	39.58	39.36	39.43	39.75	39.64
10	38.14	--	39.10	39.48	39.57	39.75	39.92	39.54	39.35	39.46	39.80	39.58
15	38.22	38.71	39.18	39.50	39.62	39.72	39.91	39.47	--	39.52	39.85	39.52
20	--	38.80	39.26	39.51	39.64	39.78	39.86	39.42	39.35	39.61	39.89	39.49
25	--	38.87	39.33	39.52	39.67	39.79	39.77	39.38	39.34	39.64	39.87	39.46
EOM	--	38.95	39.41	39.56	39.71	38.84	39.67	39.36	39.38	39.70	39.72	39.43

WTR YEAR 1980 MAX 37.98 OCT 1, 1979 MIN 39.92 APR 10, 1980

OGEMAW COUNTY

442514084164702. Local number, 23N 1E 2BAAA.
LOCATION.--Lat 44°25'14", long 084°16'47", Hydrologic Unit 04070007, 8 mi (13 km) west of Rose City on South side of Rose City Road.
Owner: Ogemaw County Road Commission.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled water-table well, diameter 1½ in (3.8 cm), depth 20 ft (6 m).
DATUM.--Altitude of land-surface datum is 1,265 ft (386 m). Measuring point: Top of casing, 2.30 ft (0.70 m) above land-surface datum.
PERIOD OF RECORD.--November 1968 to October 1971. April 1974 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 7.62 ft (2.32 m) below land-surface datum, Apr. 13, 1976; lowest measured, 13.6 ft (4.1 m) December 1972.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 19	11.24	JAN 11	11.63	APR 17	11.11	JUN 10	10.48

ONTONAGON COUNTY

465002089321601. Local number, 51N 41W 8BDBC.
LOCATION.--Lat 46°50'02", long 089°32'16", Hydrologic Unit 04020101, 325 ft (99 m) south of M-64, 1.5 mi (2.4 km) east of Silver City.
Owner: State Corrections Department.
AQUIFER.--Freda Sandstone of Keweenawan age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 100 ft (30 m), cased to 32 ft (10 m).
DATUM.--Altitude of land-surface datum is 620 ft (189 m). Measuring point: Plywood instrument shelf, 3.50 ft (1.07 m) above land-surface datum.
PERIOD OF RECORD.--October 1958 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 8.20 ft (2.50 m) below land-surface datum, Apr. 15, 1959; lowest measured, 21.82 ft (6.65 m) Dec. 15, 1976.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
FEB 14	12.80	JUN 11	11.32	SEP 3	13.70

OTSEGO COUNTY

445920084425801. Local number, 30N 3W 19ABBB.
LOCATION.--Lat 44°59'20", long 084°42'58", Hydrologic Unit 04070007, on Old Alba Road 3 mi (5 km) southwest of Gaylord.
Owner: U.S. Geological Survey.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 87 ft (27 km), screened 72 to 87 ft (22 to 27 km).
DATUM.--Altitude of land-surface datum is 1307 ft (399 m). Measuring point: Top of casing, 2.5 ft (0.8 m) above land-surface datum.
PERIOD OF RECORD.--January 1979 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 30.69 ft (9.35 m) below land-surface datum, July 24, 1979; lowest measured, 33.75 ft (10.29 m) Mar. 21, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 23	31.20	DEC 20	32.30	MAR 20	32.85	JUN 3	32.04	JUL 24	32.36	SEP 3	32.51
NOV 19	32.03	JAN 23	32.13	APR 23	31.62	JUL 8	31.97	AUG 28	32.47		

PRESQUE ISLE

451634083441801. Local number, 33N 6E 8BBBB.
LOCATION.--Lat 45°16'34", long 083°44'18", Hydrologic Unit 04070006, south side of Grand Lake Highway, 2 mi (3 km) west and 1 mi (2 km) north of Posen.
Owner: A. Styma.
AQUIFER.--Traverse Group.
WELL CHARACTERISTICS.--Drilled artesian well, diameter 6 in (15 cm), depth 61 ft (19 m).
DATUM.--Altitude of land-surface datum is 815 ft (248 m). Measuring point: Top of casing, 0.5 ft (0.2 m) above land-surface datum.
PERIOD OF RECORD.--December 1959 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 5.10 ft (1.55 m) below land-surface datum, Mar. 2, 1979; lowest measured, 16.83 ft (5.13 m) Mar. 5, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 30	14.18	JAN 16	11.28	JUN 4	9.61

ROSCOMMON COUNTY

442722084350701. Local number, 24N 2W 20BABA.
LOCATION.--Lat 44°27'22", long 084°35'07", Hydrologic Unit 04070007, 2 mi (3 km) south of Roscommon and 0.5 mi (0.8 km) east of highway M-18 on highway M-103.
Owner: State Department of Natural Resources.
AQUIFER.--Sand of Pleistocene age.
WELL CHARACTERISTICS.--Jetted water-table well, diameter 8 in (20 cm), depth 14 ft (4 m), open bottom.
DATUM.--Land-surface datum is 1,145.30 ft (349.09 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of casing, 2.50 ft (0.76 m) above land-surface datum.
REMARKS.--Federal key well.
PERIOD OF RECORD.--December 1934 to current year.
EXTREMES FOR PERIOD OF RECORD.--Highest water level, 2.30 ft (0.70 m) below land-surface datum, Apr. 23, 1971; lowest, 6.23 ft (1.90 m) Dec. 6-11, 1949

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	4.83	5.00	4.69	4.67	4.72	5.05	4.66	4.07	4.32	4.44	4.85	5.17
10	4.84	5.02	4.74	4.70	4.79	5.08	4.41	4.09	4.35	4.50	4.92	5.14
15	4.86	5.04	4.78	4.69	4.85	5.11	4.20	4.16	4.38	4.54	4.94	5.15
20	4.99	5.07	4.82	4.61	4.95	4.77	4.12	4.17	4.25	4.71	5.06	4.90
25	4.92	5.06	4.78	4.63	5.00	4.81	4.06	4.18	4.27	4.75	5.15	4.89
EOM	4.97	4.65	4.67	4.68	5.02	4.74	4.06	4.24	4.32	4.78	5.17	4.94

WTR YEAR 1980 MAX 4.06 APR 24, 1980 MIN 5.19 SEP 18, 1980

SANILAC COUNTY

433439082523601. Local number, 13N 13E 12ADAA.

LOCATION.--Lat 43°34'39", long 082"52'36", Hydrologic Unit 04090001, on Wheatland Road 3 mi (5 km) east and .75 mi (1.21 km) north of Argyle.

Owner: U.S. Geological Survey.

AQUIFER.--Marshall Formation of Mississippian age.

WELL CHARACTERISTICS.--Drilled artesian observation well, diameter 6 in (15 cm), depth 130 ft (40 m), cased with plastic pipe to 48 ft (15 m), open bottom.

DATUM.--Altitude of land-surface datum is 805 ft (245 m). Measuring point: Plywood instrument shelf, 2.5 ft (0.8 m) above land-surface datum.

PERIOD OF RECORD.--October 15, 1976 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 17.66 ft (5.38 m) below land-surface datum, Apr. 6, 1978; lowest 22.71 ft (6.92 m) Nov. 20, 1979.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980 ,
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	22.59	22.70	22.02	20.88	20.77	20.86	19.20	18.81	19.28	20.05	20.76	21.42
10	22.63	22.68	21.96	20.95	20.78	20.83	19.12	19.01	19.10	20.22	20.82	21.58
15	22.64	22.68	21.86	20.64	20.90	20.95	18.82	18.95	19.33	20.46	20.81	21.57
20	22.65	22.71	21.90	20.47	20.89	20.11	18.85	18.50	19.45	20.61	20.95	21.23
25	22.67	22.34	21.18	20.59	20.80	19.97	19.03	18.96	19.72	20.68	21.15	21.19
EOM	22.67	22.09	20.85	20.71	20.85	19.59	18.65	19.29	19.80	20.63	21.32	21.25

WTR YEAR 1980 MAX 18.47 MAY 20, 1980 MIN 22.71 NOV 20, 1979

SCHOOLCRAFT COUNTY

461720085565201. Local number, 45N 13W 16CCCB.

LOCATION.--Lat 46°17'20", long 085°56'52", Hydrologic Unit 04060106, at headquarters building Seney Wildlife refuge.

Owner: U.S. Fish and Wildlife Service.

AQUIFER.--Limestones of Upper Ordovician age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 4 in (10 cm), depth 151 ft (46 m), cased to 65 ft (20 m).

DATUM.--Altitude of land-surface datum is 710 ft (216 m). Measuring point: Top of casing, 3.60 ft (1.10 m) below land-surface datum.

PERIOD OF RECORD.--June 1952 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 4.64 ft (1.41 m) below land-surface datum, Apr. 13, 1971; lowest, 6.50 ft (1.98 m) Oct. 23, 1963.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	5.46	5.26	5.14	5.29	5.10	5.08	5.12	5.38	5.56	5.61	5.70	5.81
10	5.47	5.25	5.24	5.25	5.11	5.06	4.96	5.43	5.53	5.64	5.73	5.81
15	5.50	5.29	5.27	5.14	5.10	5.13	5.23	5.42	5.52	5.67	5.76	5.80
20	5.20	5.31	5.28	5.09	5.07	5.06	5.28	5.45	5.54	5.68	5.77	5.77
25	5.17	5.22	5.21	5.04	5.07	5.12	5.32	5.49	5.58	5.68	5.81	5.71
EOM	5.19	5.12	5.23	5.13	5.08	5.14	5.33	5.54	5.58	5.71	5.80	5.69

WTR YEAR 1980 MAX 4.87 APR 12, 1980 MIN 5.81 AUG 24, 1980

VAN BUREN COUNTY

421435085591001. Local number, 3S 14W 6BAAD.

LOCATION.--Lat 42°14'35", long 085°59'10", Hydrologic Unit 04050001, 5 mi (8 km) northwest of Paw Paw at the southwest corner of 45th and 48th Streets.

Owner: Rex Martin.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled artesian well, diameter 1½ in (3.8 cm), depth 59 ft (18 m), screened 56 to 59 ft (17 to 18 m).

DATUM.--Altitude of land-surface datum is 740 ft (226 m). Measuring point: Top of casing, 0.5 ft (.2 m) above land-surface datum.

PERIOD OF RECORD.--May 1963 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level measured, 37.22 ft (11.34 m) below land-surface datum, May 30, 1974; lowest measured, 43.28 ft (13.19 m) Nov. 20, 1964.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL	DATE	WATER LEVEL
OCT 11	39.32	JAN 29	38.84	APR 1	38.62	MAY 1	38.21	JUN 20	38.02	JUL 15	38.49
NOV 20	39.65	FEB 27	38.77								

WASHTENAW COUNTY

421228083331601. Local number, 3S 7E 24CACA.

LOCATION.--Lat 42°12'28", long 083°33'16", Hydrologic Unit 04090005, at Ypsilanti Township waterworks on Bridge Street. Owner: Ypsilanti Township.

AQUIFER.--Sand of Pleistocene age.

WELL CHARACTERISTICS.--Drilled water-table well, diameter 4 in (10 cm), depth 80 ft (24 m), screened 77 to 80 ft (23 to 24 m).

DATUM.--Land-surface datum is 665.65 ft (202.86 m) National Geodetic Vertical Datum of 1929. Measuring point: Top of coupling, 3.00 ft (0.91 m) above land-surface datum.

REMARKS.--Water level affected by nearby pumping.

PERIOD OF RECORD.--July 1943 to June 1945, December 1949 to current year.

EXTREMES FOR PERIOD OF RECORD.--Highest water level, 5.79 ft (1.76 m) below land-surface datum, Jan. 5, 1950; lowest, 22.66 ft (6.91 m) Feb. 13, 1971.

WATER LEVEL, IN FEET BELOW LAND-SURFACE DATUM, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980
LOW VALUES

DAY	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
5	12.64	15.15	15.00	--	14.76	14.72	13.39	--	12.77	12.82	12.72	12.55
10	12.75	--	15.44	--	14.68	14.66	13.40	13.37	--	12.82	12.68	12.59
15	12.81	15.75	--	--	14.80	14.76	13.53	13.21	--	12.87	12.74	12.59
20	12.83	15.52	--	14.43	14.70	14.10	13.71	12.93	12.68	13.91	12.68	12.51
25	13.37	14.91	--	14.44	14.54	--	13.87	12.94	12.77	13.30	--	12.51
EOM	14.54	14.60	--	14.72	14.83	13.41	--	12.89	12.91	12.87	12.55	--

WTR YEAR 1980 MAX 12.40 SEP 22, 1980 MIN 15.83 NOV 16, 1979

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980

LOCAL IDENT-I-FIER	STATION NUMBER	DATE OF SAMPLE	TIME	SAMP-LING DEPTH (FT)	SPE-CIFIC CON-DUCT-ANCE (MICRO-MHOS)	PH (UNITS)	TEMPER-ATURE, AIR (DEG C)	TEMPER-ATURE, WATER (DEG C)	COLOR (PLAT-INUM COBALT UNITS)
			ALGER						
47N18W19CAD 01 NPS T74-1	462708086362901	80-08-18	1330	46	173	6.7	19.5	9.5	300
48N16W18BC 01	463330086214501	80-08-18	1515	28	249	7.8	22.0	7.5	2
49N 15W 17CAAB02 ALGER	463833086123702	80-08-19	1000	90	102	8.5	18.0	8.0	2
49N 15W 03CDDA01 ALGER	463956086100001	80-08-19	1100	128	232	8.0	18.0	7.5	4
49N 15W 02ADCC01 ALGER	463802086081501	80-08-19	1335	30	272	8.0	25.0	8.5	3
49N14W01DC 01 A. ABRAHAM	464002086000201	80-08-19	1630	120	294	7.6	25.0	9.0	2
49N14W12BC 01 MIXON, W.	463948086003101	80-08-19	1730	--	278	7.0	23.5	10.5	2
48N15W06ACD 01 KINGSTON	463508086133601	80-08-20	0935	34	111	6.5	21.0	8.0	100
48N16W17 01 BEAVER LAKE	463327086200601	80-08-20	1240	262	248	7.9	22.0	8.0	4
47N18W03CCD 01 NPS T74-3	462938086330001	80-08-20	1500	250	510	7.4	27.0	10.5	2
47N 18W 10AADB01 ALGER	462926086320201	80-08-20	1725	300	314	7.7	25.0	7.0	1
46N 19W 02BDCC01 ALGER	462446086391201	80-08-21	0930	178	161	8.1	23.0	7.5	3
			LEELANAU						
28N 14W 08DDCA01 LELANU	445020086012201	80-05-15	1415	138	330	7.5	--	8.0	0
28N 14W 18BABB01 LELANU	445011086031401	80-05-15	1545	60	325	7.7	--	8.0	0
		80-08-25	1630	60	293	7.6	--	10.0	2
28N 14W 08DDCA01 LELANU	445020086012201	80-08-26	1030	138	286	7.4	--	10.0	5
CLEVELAND TOWNSHIP WELL	445517085522001	80-08-26	1330	48	256	7.7	--	12.0	6
DUNE CLIMB WELL	445235086023001	80-08-26	1700	46	806	7.4	--	11.0	4
SHELDA SPRINGS NR BASS L	445545085531001	80-08-27	1800	--	237	7.5	--	14.0	5

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

LOCAL IDENT-I-FIER	DATE OF SAMPLE	TUR-BID-ITY (NTU)	HARD-NESS (MG/L AS CACO3)	HARD-NESS, NONCAR-BONATE (MG/L CACO3)	CALCIUM DIS-SOLVED (MG/L AS CA)	MAGNE-SIUM, DIS-SOLVED (MG/L AS MG)	SODIUM, DIS-SOLVED (MG/L AS NA)	SODIUM PERCENT	SODIUM AD-SORP-TION RATIO	POTAS-SIUM, DIS-SOLVED (MG/L AS K)
				ALGER						
47N18W19CAD 01 NPS T74-1	80-08-18	7.3	55	0	15	4.3	1.3	5	.1	.7
48N16W18BC 01	80-08-18	.50	120	0	34	9.3	1.2	2	.0	2.6
49N 15W 17CAAB02 ALGER	80-08-19	.10	52	0	15	3.5	1.0	4	.1	.5
49N 15W 03CDDA01 ALGER	80-08-19	6.6	100	0	22	11	5.4	10	.2	8.2
49N 15W 02ADCC01 ALGER	80-08-19	45	89	0	22	8.3	15	24	.7	11
49N14W01DC 01 A. ABRAHAM	80-08-19	.80	150	0	35	14	1.7	2	.1	12
49N14W12BC 01 MIXON, W.	80-08-19	2.2	140	33	36	12	4.2	6	.2	3.2
48N15W06ACD 01 KINGSTON	80-08-20	32	43	0	13	2.6	.8	4	.1	.6
48N16W17 01 BEAVER LAKE	80-08-20	3.3	120	1	36	8.2	3.9	6	.2	1.7
47N18W03CCD 01 NPS T74-3	80-08-20	.30	300	42	69	30	1.2	1	.0	1.7
47N 18W 10AADB01 ALGER	80-08-20	.90	160	0	41	13	2.7	3	.1	6.5
46N 19W 02BDCC01 ALGER	80-08-21	.10	80	37	23	5.5	10	21	.5	.7
				LEELANAU						
28N 14W 080DCA01 LELANU	80-05-15	.30	160	5	43	13	2.7	3	.1	7.5
28N 14W 18BABB01 LELANU	80-05-15	.20	170	2	45	15	.9	1	.0	.4
	80-08-25	.20	180	18	45	16	.9	1	.0	.5
28N 14W 080DCA01 LELANU	80-08-26	.20	150	19	40	12	2.9	4	.1	8.0
CLEVELAND TOWNSHIP WELL	80-08-26	.30	170	0	48	12	.9	1	.0	.8
DUNE CLIMB WELL	80-08-26	.40	370	220	99	31	13	7	.3	1.4
SHELDA SPRINGS NR BASS L	80-08-27	.50	160	--	43	12	1.6	2	.1	1.0

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

LOCAL IDENT- I- FIER	DATE OF SAMPLE	BICAR- BONATE (MG/L AS HCO3)	CAR- BONATE (MG/L AS CO3)	ALKA- LINITY (MG/L AS CACO3)	CARBON DIOXIDE DIS- SOLVED (MG/L AS CO2)	SULFATE DIS- SOLVED (MG/L AS SO4)	CHLO- RIDE, DIS- SOLVED (MG/L AS CL)	FLUO- RIDE, DIS- SOLVED (MG/L AS F)	SILICA, DIS- SOLVED (MG/L AS SIO2)	SOLIDS, RESIDUE AT 180 DEG. C DIS- SOLVED (MG/L)
				ALGER						
47N18W19CAD 01 NPS T74-1	80-08-18	110	0	90	35	11	3.0	.1	17	121
48N16W18BC 01	80-08-18	150	0	123	3.8	10	.5	.1	7.6	131
49N 15W 17CAAB02 ALGER	80-08-19	60	4	56	.3	5.2	.4	.1	7.9	58
49N 15W 03CDDA01 ALGER	80-08-19	140	0	115	2.2	11	.4	.5	6.1	130
49N 15W 02ADCC01 ALGER	80-08-19	140	0	115	2.2	27	1.7	.5	9.7	157
49N14W01DC 01 A. ABRAHAM	80-08-19	200	0	164	8.0	3.5	.5	.2	12	172
49N14W12BC 01 MIXON, W.	80-08-19	130	0	107	21	12	15	.1	5.9	189
48N15W06ACD 01 KINGSTON	80-08-20	72	0	59	36	2.4	.9	.1	6.8	80
48N16W17 01 BEAVER LAKE	80-08-20	150	0	123	3.0	8.8	4.5	.2	9.2	140
47N18W03CCD 01 NPS T74-3	80-08-20	310	0	254	20	42	5.8	.2	4.9	334
47N 18W 10AADB01 ALGER	80-08-20	190	0	156	6.1	13	1.2	.3	6.9	169
46N 19W 02BDCC01 ALGER	80-08-21	97	0	43	.7	4.6	.4	.1	8.9	--
				LEELANAU						
28N 14W 08DDCA01 LELANU	80-05-15	190	0	160	9.6	11	8.9	.1	6.4	189
28N 14W 19BABB01 LELANU	80-05-15	210	0	170	6.7	8.8	.8	.1	7.6	179
	80-08-25	200	0	160	7.8	10	1.7	.2	8.2	190
28N 14W 08DDCA01 LELANU	80-08-26	180	0	130	19	12	9.1	.1	6.9	190
CLEVELAND TOWNSHIP WELL	80-08-26	210	3	172	6.7	8.8	1.7	.1	4.5	186
DUNE CLIMB WELL	80-08-26	190	0	156	12	12	170	.2	5.8	672
SHELDA SPRINGS NR BASS L	80-08-27	--	--	--	--	8.3	3.4	.1	4.0	156

WATER QUALITY DATA, WATER YEAR OCTOBER 1979 TO SEPTEMBER 1980--Continued

LOCAL IDENT-I-FIER	DATE OF SAMPLE	SOLIDS, SUM OF CONSTI-TUENTS, DIS-SOLVED (MG/L)	SOLIDS, DIS-SOLVED (TONS PER AC-FT)	NITRO-GEN, NITRATE TOTAL (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRATE DIS-SOLVED (MG/L AS NO3)	NITRO-GEN, NITRITE TOTAL (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS N)	NITRO-GEN, NITRITE DIS-SOLVED (MG/L AS NO2)	NITRO-GEN, NO2+NO3 TOTAL (MG/L AS N)
				ALGER						
47N18W19CAD 01 NPS T74-1	80-08-18	129	.16	--	.01	.04	--	.00	.00	--
48M16W18BC 01	80-08-18	140	.18	--	.13	.58	--	.00	.00	--
49N 15W 17CAAB02 ALGER	80-08-19	68	.08	--	.07	.31	--	.00	.00	--
49N 15W 03CDDA01 ALGER	80-08-19	134	.18	--	.00	.00	--	.01	.03	--
49N 15W 02ADCC01 ALGER	80-08-19	164	.21	--	.01	.04	--	.01	.03	--
49N14W01DC 01 A. ABRAHAM	80-08-19	178	.23	--	.00	.00	--	.00	.00	--
49N14W12BC 01 MIXON, W.	80-08-19	161	.26	--	1.9	8.4	--	.00	.00	--
48N15W06ACD 01 KINGSTON	80-08-20	71	.11	--	.00	.00	--	.00	.00	--
48N16W17 01 BEAVER LAKE	80-08-20	147	.19	--	.07	.31	--	.00	.00	--
47N18W03CCD 01 NPS T74-3	80-08-20	309	.45	--	.00	.00	--	.00	.00	--
47N 18W 10AADB01 ALGER	80-08-20	180	.23	--	.22	.97	--	.00	.00	--
46N 19W 02BDCC01 ALGER	80-08-21	101	.11	1.0	--	--	.00	--	--	1.0
				LEELANAU						
28N 14W 08DDCA01 LELANU	80-05-15	193	.26	--	1.4	E6.2	--	.00	.00	--
28N 14W 18RABR01 LELANU	80-05-15	186	.24	--	.82	E3.6	--	.00	.00	--
	80-08-25	181	.26	.87	--	--	.00	--	--	.87
28N 14W 08DDCA01 LELANU	80-08-26	180	.26	1.6	--	--	.00	--	--	1.6
CLEVELAND TOWNSHIP WELL	80-08-26	181	.25	--	.05	.22	--	.00	.00	--
DUNE CLIMB WELL	80-08-26	437	.91	--	2.4	11	--	.01	.03	--
SHELDA SPRINGS NR RASS L	80-08-27	--	.21	--	.00	.00	--	.00	.00	--

October 1, 1978

FACTORS FOR CONVERTING INCH-POUND UNITS TO INTERNATIONAL SYSTEM UNITS (SI)

The following factors may be used to convert the inch-pound units published herein to the International System of Units (SI). This report contains both the inch-pound and SI unit equivalents in the station manuscript descriptions.

Multiply inch-pound units	By	To obtain SI units
	Length	
inches (in)	2.54×10^{1}	millimeters (mm)
	2.54×10^{-2}	meters (m)
feet (ft)	3.048×10^{-1}	meters (m)
miles (mi)	1.609×10^{0}	kilometers (km)
	Area	
acres	4.047×10^{3}	square meters (m^2)
	4.047×10^{-1}	square hectometers (hm^2)
	4.047×10^{-3}	square kilometers (km^2)
square miles (mi^2)	2.590×10^{0}	square kilometers (km^3)
	Volume	
gallons (gal)	3.785×10^{0}	liters (L)
	3.785×10^{0}	cubic decimeters (dm^3)
	3.785×10^{-3}	cubic meters (m^3)
million gallons	3.785×10^{3}	cubic meters (m^3)
	3.785×10^{-3}	cubic hectometers (hm^3)
cubic feet (ft^3)	2.832×10^{1}	cubic decimeters (dm^3)
	2.832×10^{-2}	cubic meters (m^3)
cfs-days	2.447×10^{3}	cubic meters (m^3)
	2.447×10^{-3}	cubic hectometers (hm^3)
acre-feet (acre-ft)	1.233×10^{3}	cubic meters (m^3)
	1.233×10^{-3}	cubic hectometers (hm^3)
	1.233×10^{-6}	cubic kilometers (km^3)
	Flow	
cubic feet per second (ft^3/s)	2.832×10^{1}	liters per second (L/s)
	2.832×10^{1}	cubic decimeters per second (dm^3/s)
	2.832×10^{-2}	cubic meters per second (m^3/s)
gallons per minute (gal/min)	6.309×10^{-2}	liters per second (L/s)
	6.309×10^{-2}	cubic decimeters per second (dm^3/s)
	6.309×10^{-5}	cubic meters per second (m^3/s)
million gallons per day	4.381×10^{1}	cubic decimeters per second (dm^3/s)
	4.381×10^{-2}	cubic meters per second (m^3/s)
	Mass	
tons (short)	9.072×10^{-1}	megagrams (Mg) or metric tons

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